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MONTHLY REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR

JANUARY, 1874.

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1874.

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MONTHLY REPORT.

DEPARTMENT OF AGRICULTURE,
Statistical Division, January 26, 1874.

SIR: I herewith submit for publication my report of agricultural statistics for the present month of the current year, including an investigation concerning prices and yields of farm crops, and comparative numbers of domestic animals in the several States on the 1st of January, with the average prices of each kind for each State, together with a review of recent advances in agricultural science in its practical application, and a record of current work of the several branches of the Department service.

Respectfully,

J. R. DODGE,
Statistician.

Hon. FREDERICK WATTS,
Commissioner.

PRICES OF FARM PRODUCTS AND FARM ANIMALS.

The annual investigation concerning yields and prices of principal farm productions, and of numbers and prices of the animals of the farm has been completed, with results as indicated in the following paragraphs.

YIELD.—*Corn.*—There is no State in which corn is a crop of any general importance which reports the yield of last year. Only Massachusetts, Florida, West Virginia, Oregon, and California maintain their previous rate of production. The decline is considerable in all sections of the country, but is greatest in the heart of the corn-growing region. The lowest rate in the Western States is 21 bushels in Illinois. The estimated average in Kansas is 22.5; in Missouri, 23.5; in Nebraska, 25.7; Iowa, 29; Indiana, 29.6: Wisconsin, 30; Michigan, 31. In the Gulf States the usual yield is less than in other portions of the country; the decline from last year is generally heavy. The yields of Arkansas and Tennessee, which ordinarily produce more heavily than any of the other Southern States, are, respectively, 23.5 and 22.5. The rates in the following States bear an increasing ratio from east to west: South Carolina, 9.5; Georgia, 12.3; Alabama, 14.5; Mississippi, 15.5; Louisiana, 16.5; Texas, 19. The corn-fields of these States have undoubtedly some of the richest soil in the country, yet the product is small in com-

parison with the yield of the Miami and Sciota bottoms and the prairies of Illinois; many have thought that thin planting—a single stalk in a hill—has some influence upon this result. In the Middle States the reported yield is less by one-eighth than last year. In New York from 37.5 to 31 bushels; in Pennsylvania, from 39 to 35.1; and in New Jersey, from 39.5 to 36. The highest estimated average this year is 41 bushels in California; the lowest, 9.5 in South Carolina. The estimated quantity of the crop of 1872 was 1,092,719,000 bushels; its area 35,526,836 acres; average yield, 30.7 bushels. The average yield in 1873 is 23.3 bushels per acre.

Wheat.—The yield of wheat in New England is a little less than last year; is materially larger in the Middle States and in Maryland, smaller in all the Southern States and in West Virginia, and north of the Ohio and west of the Mississippi the average yield is larger, the main improvement being in Illinois, Missouri, Kansas, and Nebraska. The rate of production in California is less. The yields of wheat-growing States are reported as follows: Ohio, 12 bushels; Michigan, 12.2; Indiana, 12.3; Illinois, 13.5; Wisconsin, 16.5; Minnesota, 16.8; Iowa, 13; Missouri, 12.8; Kansas, 15,5; Nebraska, 15.5; California, 13.5. In the South the range is from 5.5 in South Carolina to 17 bushels in Texas. The highest yields are 19 bushels in Oregon and Massachusetts, (in the latter State the whole area is scarcely equal to one of the larger class of western farms,) and the smallest in South Carolina.

Other grains.—The average yields of rye and barley are less than in 1872 in nearly all the States; and the rate of production in oats is also reduced in many States; yet it is placed at higher figures in Wisconsin, Missouri, and Kansas in the West, and in all of the Middle States. The figures for the principal interior States are: Ohio, 27 bushels; Michigan, 30.2; Indiana, 25; Illinois, 30; Wisconsin, 35; Minnesota, 36.3; Iowa, 33; Missouri, 28; Kansas, 33; Nebraska, 30.

Potatoes.—The rate of yield of this esculent is low for most of the States. The highest yields are in New England and New York, being 100 bushels or more in all but Rhode Island and Connecticut, and 130 in Oregon, no other States reaching a higher figure than 97. In the South the range is from 60 in Louisiana to 94 in North Carolina, next to the latter coming Florida, Texas, Mississippi, and Alabama.

Hay.—The yield of hay per acre differs little from that of 1872. The rate is highest in Texas, 1.5 tons; in Oregon and Nebraska, 1.4; 1.38 in Minnesota; 1.37 in California; 1.3 in Wisconsin and Kansas; 1.27 in Mississippi; 1.25 in Iowa, Missouri, Illinois, Indiana, and Tennessee; 1.23 in Kentucky; 1.20 in North Carolina, Alabama, and Louisiana; 1.18 in Arkansas; 1.15 in Michigan and Pennsylvania; 1.10 in Vermont, South Carolina, and West Virginia; 1.09 in Connecticut; 1.05 in Ohio, Georgia, and New Hampshire; 1.04 in Massachusetts; 1.03 in New Jersey; 1.02 in New York; 1 in Maryland and Virginia; .95 in Rhode Island; .93 in Maine; .81 in Delaware.

PRICES OF FARM CROPS—*Corn.*—The effect of a diminished yield of corn is a marked increase in its price, notwithstanding the average quality is inferior. The prices given are not those of principal commercial cites, but the average of local prices in the home markets of each county—the prices received by farmers at home rather than those paid by buyers in the great marts of trade. The difference between the rates of this and the previous season, from the Missouri to the sea-board, may be gathered by reference to the figures for the following States:

	December, 1873.	December, 1872.
New Jersey	62 cents.	62 cents.
Pennsylvania	60 "	60 "
Ohio	42 "	34 "
Indiana	40 "	29 "
Illinois	32 "	24 "
Iowa	31 "	18 "
Nebraska	28 "	18 "

In New Jersey and Pennsylvania there has been no increase. The difference is greatest in Iowa and Nebraska, the advance being 72 per cent. in Iowa, 55 in Nebraska, 33 in Illinois, 37 in Indiana, and 20 in Ohio. The greatest glut of last year's crop was in Iowa, the more eastern States having a larger proportion of farm stock to feed and fatten. In New York the average price of home-grown corn is the same as last year, and about the same in the New England States; in some of them even lower this year. The New York City prices of western corn were in January last 65 to 66 cents; this season 78 to 85. It should not be forgotten that the prices given in the Atlantic States are those for home-grown corn, which commands higher prices than that brought from the West. In the northwest where the quantity grown is only equal to the requirements for home consumption, the price is little higher than last year; in Wisconsin 44 against 40 last year; Minnesota 41 against 36 last year. In Texas the advance is from 43 to 80 cents; in Tennessee and Arkansas the increase is material, but in the other States of the South the difference is comparatively slight.

The shipments of corn being almost inappreciable portions of the crop in nine counties out of every ten, the home prices of different counties, especially in all Western States, vary greatly with the variations in home demand and supply. In Pope and Pulaski, Illinois, the price returned is 50 cents; in Mason and La Salle but 22 cents; in Kankakee and Jersey, 25 cents; in Putnam and Ford, 28; most of the others ranging between 30 and 45. Of 55 counties reporting in Illinois, 31 return above 30 cents per bushel.

A similar range is observed in Iowa—Adams, Union, and Fremont, reporting 20 cents; Allamakee, Emmett, Plymouth, and Winnesheik, 50 cents; Dubuque and Chickasaw, 45; Buenavista, Calhoun, Crawford, Clayton, Clinton, Fayette, Jackson, Humboldt and Woodbury, 40.

The influence of prominent towns on prices of corn suggests the advantages of local bodies of consumers in the heart of the producing region, and offers a hint toward the problem of better remuneration, which no increase of transportation facilities can equal in promised efficacy. Comparing the prices from Ohio to Nebraska, they are found lowest where the smallest proportion of the population are engaged in industries outside of agriculture. The rapid increase of mechanical, manufacturing, and mining industry in the Ohio basin, illustrates the feasibility of a more equal distribution of producers and consumers. It is well known that the amount of corn shipped from this basin is an insignificant proportion of what is produced within it. Allowing the prominent town to represent its county, as better known to those outside of the State, we have the price of corn in Dubuque, Iowa, 45 cents, 40 in Clinton, 41 in Davenport, Des Moines 35 cents, an average above 40, and very little lower than the average for Ohio, and more than 25 per cent. above the general average for the State. Nebraska has in former years obtained higher prices than Iowa, not only by the reason of the demand from immigrants before they have made a crop, but from the demand from the Territories beyond.

Wheat.—The price of wheat is a little lower than last year. The comparison in prominent wheat-growing States is as follows:

	1873.	1872.
	Per bushel.	
Ohio	$1.31	$1.42
Michigan	1.35	1.46
Indiana	1.22	1.32
Illinois	1.10	1.23
Wisconsin	97	1.03
Minnesota	80	83
Iowa	79	85
Missouri	1.13	1.41
Kansas	1.00	1.42
Nebraska	75	78

The influence of a partial crop failure in 1872 is marked in Missouri and Kansas, causing great scarcity and high price. The fact that Kansas this year obtains a higher price than Wisconsin, and Missouri higher than any other State west of Indiana, shows that other causes than facilities for transportation affect the price of grain. The quantity grown in Missouri is much less than half the crop of Iowa, and is largely manufactured in her own mills. Kansas always obtains remunerative prices for wheat, because immigrants at home and in adjoining Territories absorb any surplus without necessitating a dependence on eastern markets.

Other crops.—Rye commands rather better prices than last year in New England, slightly lower in the Middle States, in the South variable with increase or decrease of quantity, (being saved mainly for seeding winter pastures,) and in most Western States slightly increased rates, just in proportion to the rate of yield and comparative supply.

The averages for oats are some above and others below those of last year, according to local production. The prices in prominent States as follows:

	N. Y.	Pa.	Ohio.	Ind.	Ill.	Iowa.	Mo.	Kans.
1873	43	43	35	32	28	27	30	23
1872	44	43	29	25	19	16	23	22

A reference to the tables will show a positive increase in the prices of barley in nearly all the States.

A heavy increase in the price of potatoes is observed in the Western States, while a decline is seen in the seaboard States. The comparison in the West is as follows:

	Ohio.	Mich.	Ind.	Ill.	Wis.	Iowa.	Mo.
1873	88	76	85	112	80	88	87
1872	63	63	54	46	44	22	50

The price of hay rules a little lower than last season in most of the States; rather higher in Massachusetts and New Hampshire; lower in Rhode Island and Connecticut; about the same in New York; a decline in New Jersey and Pennsylvania, a majority of the Southern, and most of the Western States. The following illustration of different sections is given as the price per ton.

	N. Y.	Va.	Ga.	Texas.	Tenn.	Ill.	Kans.
1873	$18 00	$17 20	$20 50	$12 75	$15 50	$8 75	$3 90
1872	18 60	21 25	25 31	13 52	15 46	9 47	3 89

For the value of other crops in and details of local prices of the above, reference is made to the tables.

The influence of the law of supply and demand upon price—relative quantity acting with great delicacy as an indicator of value—is all-pow-

erful, and shows that it is useless for farmers to expect average returns from production much above the usual demand for consumption. It appears to be a self evident proposition; but it proves a difficult one for producers to appreciate.

COMPARATIVE NUMBERS AND PRICES OF FARM ANIMALS.

NUMBERS.—*Horses:* Returns relating to the numbers and prices of farm animals in 1873 show a decrease of horses of 1 per cent. in Connecticut, Georgia, Florida, and Alabama, and 7 per cent. in California. Maine, New Hampshire, Vermont, Rhode Island, New York, New Jersey, Delaware, Maryland, North Carolina, Kentucky, Ohio, and Wisconsin report the same number as in 1872. In the remaining States the increment varies from 1 per cent. in Massachusetts, Mississippi, Louisiana, Arkansas, West Virginia, Indiana, and Illinois, to 111 in Kansas and 119 in Nebraska.

Mules: California reports a decrease of mules of 8 per cent; Oregon, 6 per cent.; Indiana, 5 per cent.; Iowa, Wisconsin, and Florida, 3 per cent. each; Illinois, 2 per cent.; Michigan, Ohio, Kentucky, Alabama, Maryland, and New York, 1 per cent. each. The other States show either an equal or an increased number, the maximum, 10 per cent., being in Kansas. None of the New England States make any returns under this head.

Oxen and other cattle: A decline of 15 per cent. is manifested in Texas; 5 per cent. in Rhode Island and Delaware; 4 per cent. in Louisiana; 3 per cent. in Connecticut, New York, Alabama, and California; 2 per cent. in Vermont, Mississippi, and Ohio; 1 per cent. in New Jersey and Kentucky. All the other States report a number fully equal to or greater than the previous year, the maximum, 20 per cent., being in Nebraska.

Milch cows: Nearly all the States report the number of cows as equal to or in excess of last year. Texas declines 7 per cent.; Delaware and Florida, 4 per cent.; Louisiana, 3 per cent.; Massachusetts, New York, and Alabama, 2 per cent.; Rhode Island, North Carolina, and Ohio, 1 per cent. A number equal to the previous year is found in Vermont, Connecticut, New Jersey, Maryland, Virginia, Georgia, Mississippi, Tennessee, Kentucky, and Michigan. In the remaining States an increase varies from 1 per cent. in Arkansas to 15 per cent. in California.

Sheep: An enormous increase, 96 per cent., is noted in Kansas, several counties having during the year developed a very considerable enterprise in sheep-husbandry. Large flocks were directly imported by resident farmers, but a very large proportion of the increase was brought in by emigrant settlers. California increased her flocks 17 per cent.; Arkansas, 10 per cent.; Maine and Texas, 8 per cent.; Nebraska, 7 per cent.; Oregon, 5 per cent.; Minnesota, 4 per cent.; New Hampshire, Connecticut, Maryland, and Wisconsin, 3 per cent.; Massachusetts, Alabama, and Michigan, 2 per cent.; Illinois, 1 per cent.; New Jersey and Ohio report a number equal to the previous year. In all the other States there is a decrease, ranging from 1 per cent. in South Carolina and West Virginia, to 12 per cent., in Louisiana and 15 per cent. in Delaware.

Hogs: The only States reporting an increase are Kansas and Nebraska, 6 per cent.; California and Oregon, 5 per cent.; Alabama, 3 per cent.; Delaware, 2 per cent.; Florida, 1 per cent. The greatest decrease, 15 per cent., is found in Louisiana. Tennessee declines 11 per cent.; New Hampshire and Arkansas, 10 per cent.; Ohio, 9 per cent.; Vermont, Virginia, Mississippi, Indiana, and Illinois, 8 per cent.; Texas, 7 per

cent.; Michigan and Wisconsin, 6 per cent.; Rhode Island, Pennsylvania, West Virginia, and Kentucky, 5 per cent. The remaining States show minor rates of decrease.

PRICES.—A general decline of prices is noted in all parts of the Union. New Jersey, however, indicates a slight advance in all kinds of farm animals.

Horses: An average increase in the price of horses is shown in Maine, New Hampshire, Massachusetts, Rhode Island, New Jersey, Iowa, Nebraska, and California. In Texas prices remain comparatively unchanged. In all the other States there is a decline. In Maine, Massachusetts, and Rhode Island the increase is decided. In Massachusetts the comparison is as follows:

	1 year.	2 years.	3 years.	Over 3 years.
1873	$33 20	$55 00	$84 40	$130 00
1874	40 00	66 70	95 00	142 50

The increase in New Hampshire is not great, while in Connecticut there is a small decrease. New York indicates a considerable decline, as follows:

	1 year.	2 years.	3 years.	Over 3 years.
1873	$42 00	$69 50	$99 00	$135 00
1874	38 20	63 67	92 54	125 50

New Jersey reports an increase a little greater than the decrease of New York. The South Atlantic and Gulf States show a marked decline, except in Texas, where prices remain stationary. The southern inland States and those north of the Ohio River present nearly the same indications. Ohio presents the following comparison:

	1 year.	2 years.	3 years.	Over 3 years.
1873	$34 39	$53 89	$77 00	$104 45
1874	34 17	53 80	76 75	103 81

Kentucky, Michigan, Indiana, and Illinois present a much wider variation.

West of the Mississippi River, Iowa exhibits some increase in the prices of older horses, but all the other States of this section show a marked decline. Missouri may be taken as a specimen:

	1 year.	2 years.	3 years.	Over 3 years.
1873	$24 72	$36 62	$51 45	$72 35
1874	21 25	34 00	49 64	68 75

On the Pacific coast, California shows an increase and Oregon a decrease.

Mules: Prices are increased in South Carolina and Iowa; in New Jersey, Texas, and Tennessee they remain about the same as in the previous year, and decline in all the other States.

Cows: An increase is shown in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New Jersey, Delaware, Maryland, Texas, and Tennessee; in all other States there is a decline.

Oxen and other cattle: The older grades of cattle show a large increase in Maine. There is a general increase in New Jersey, Virginia, Texas, Minnesota, and Iowa. New Hampshire, Massachusetts, Mississippi, and Illinois present but little change; all other States decline.

Sheep: An increase is shown in Massachusetts, New Jersey, Maryland, Mississippi, Texas, and Tennessee; all others decline.

Hogs: An increased rate of prices is noted in Maine, New Hampshire, Vermont, Rhode Island, Connecticut, New Jersey, Delaware, Mississippi, Arkansas, West Virginia, Kentucky, Ohio, Michigan, Indiana, Illinois, Iowa, Missouri, and California; the other States indicate a decline.

Table showing the average yield per acre and price of the principal crops of the United States for 1873, *and the area and condition of winter grain.*

States.	CORN.		WHEAT.		RYE.		OATS.		BARLEY.		BUCKWHEAT.		POTATOES. (*Solanum tuberosum.*)	
	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.	Average yield per acre in 1873, stated in bushels.	Average price per bushel on 1st day of December, 1873.
Maine	24	$0 91	11	$1 90	14.5	$1 15	21	$0 58	16.7	$0 91	17.4	$0 72	117	$0 52
New Hampshire	37.5	92	15	1 88	17.2	1 10	36	55	20	1 00	18.7	75	150	48
Vermont	31	85	16	1 67	16.1	95	32.6	49	23.8	86	20.5	72	140	44
Massachusetts	35	84	19	1 66	17	1 04	33.3	59	22	1 03	15.6	86	125	70
Rhode Island	28.7	92	.....	.....	16.2	97	31.3	61	25.5	1 15	.....	.....	96	81
Connecticut	30	94	18	1 65	16	1 06	32	60	23.5	1 10	18.2	98	97	83
New York	31	70	13.5	1 60	14	86	31	43	21.2	1 10	19.7	77	103	54
New Jersey	36	62	16.2	1 65	14.1	85	26.5	49	.....	.....	16.5	96	90	67
Pennsylvania	35.1	60	14.2	1 50	14.5	81	30.2	43	20.6	1 05	19.5	84	96	65
Delaware	19	53	11	1 68	11	87	19.3	46	.....	.....	23	70	97	78
Maryland	21.4	68	11.3	1 54	12.5	80	18.8	44	18	85	17	75	80	70
Virginia	19	59	7.5	1 45	9.7	78	16.3	44	18.5	70	17.9	70	70	71
North Carolina	14.2	64	6.2	1 55	8.1	85	16.3	56	16.6	66	16.6	65	94	69
South Carolina	9.5	94	5.5	2 25	7	1 60	14	85	20	2 00	.....	.....	70	1 10
Georgia	12.3	82	7	1 75	6	1 64	13.4	75	13.2	1 20	.....	.....	78	1 15
Florida	10.4	1 11	.....	.....	.....	.....	13	1 02	.....	.....	.....	.....	93	1 50
Alabama	14.5	84	7.3	1 70	9.4	1 56	15.5	78	.....	.....	.....	.....	80	1 20
Mississippi	15.5	85	9.6	1 75	10	1 60	14.4	86	.....	.....	.....	.....	87	1 20
Louisiana	16.5	90	.....	.....	.....	.....	16.3	84	.....	.....	.....	.....	60	1 05
Texas	19	80	17	1 40	17	1 10	30	82	30	1 04	.....	.....	90	1 65
Arkansas	23.5	80	10	1 50	12.8	1 50	23.4	70	.....	.....	.....	.....	80	1 00
Tennessee	22.5	58	7.2	1 33	9	90	20.6	41	19.2	85	10.5	95	75	66
West Virginia	29	54	9.6	1 43	12.8	84	27	38	24	92	17.1	81	70	70
Kentucky	29.5	44	9	1 21	8.5	77	24	36	20	1 00	15.3	86	55	62
Ohio	35	42	12	1 31	11	75	27	35	21.8	98	11.4	99	85	88
Michigan	31	47	12.2	1 35	13.5	72	30.2	34	18	91	14.3	78	75	76
Indiana	29.6	40	12.3	1 22	14.2	71	25	32	22.2	1 06	12.1	88	56	85
Illinois	21	32	13.5	1 10	15.5	58	30	28	23	95	8.5	99	40	1 12
Wisconsin	30	44	16.5	97	15.7	62	35	33	26.6	1 08	11	92	71	80
Minnesota	31.5	41	16.8	80	17.3	51	36.3	33	22	77	16.6	82	70	63
Iowa	29	31	13	79	18	48	33	27	19	73	10.5	95	44	88
Missouri	23.5	38	12.8	1 13	14.5	64	28	30	21	86	12.5	77	38	87
Kansas	22.5	31	15.5	1 00	17.5	56	33	23	23	70	9.5	80	30	94
Nebraska	25.7	28	15.5	75	16	53	30	26	30	82	14.5	67	28	98
California	41	73	13.5	1 32	20	90	30	84	26.5	85	23.5	1 20	110	85
Oregon	30	60	19	90	25	82	37.5	42	28	52	20.3	1 20	130	56

Table showing the average yield per acre and price of the principal crops, &c.—Continued.

States.	POTATOES. (*Batatas edulis, sweet.*)		LEAF-TOBACCO.		HAY.		SORGHUM MOLASSES.		WINTER WHEAT.		WINTER RYE.		WINTER BARLEY.	
	Average yield per acre in 1873, stated in bushels.	Average price per bush. on 1st day of December, 1873.	Average yield per acre in 1873, stated in pounds.	Average price per pound on 1st day of December, 1873.	Average yield per acre in 1873, stated in tons and hundredths.	Average price per ton on 1st day of December, 1873.	Average yield per acre in 1873, stated in gallons.	Average price per gallon on 1st day of December, 1873.	Average area sown compared with 1872.	Condition of the crop compared with an average.	Average area sown compared with 1872.	Condition of the crop compared with an average.	Average area sown compared with 1872.	Condition of the crop compared with an average.
Maine	.....	.....	.....	.....	.93	$12 20	.....	.....	.....	.....	95	100	.....	.....
New Hampshire	.....	.....	1,500	$0 15	1.05	15 00	.....	.....	.....	.....	100	102	.....	.....
Vermont	.....	.....	1,400	20	1.10	13 38	.....	.....	.....	.....	143	100	.....	.....
Massachusetts	.....	.....	1,200	17	1.04	25 10	.....	.....	.....	.....	104	101	.....	.....
Rhode Island	.....	.....	.....	.....	.95	27 50	.....	.....	.....	.....	95	91	.....	.....
Connecticut	.....	.....	1,750	23	1.09	25 00	.....	.....	.....	.....	95	109	.....	.....
New York	.....	.....	.....	.....	1.02	18 00	.....	.....	99	102	98	100	90	100
New Jersey	83	$1 24	.....	.....	1.03	24 50	.....	.....	97	100	100	100	.....	.....
Pennsylvania	82	1 48	1,375	12.3	1.15	17 80	127	$0 57	101	102	99	101	100	102
Delaware	82	75	.....	.....	.81	26 00	75	50	109	100	100	100	.....	.....
Maryland	108	1 06	700	7.7	1.00	19 00	.....	.....	103	103	97	103	.....	.....
Virginia	87	75	650	9.2	1.00	17 20	80	66	100	98	91	97	.....	.....
North Carolina	98	55	597	9	1.20	13 00	73	48	106	99	100	99	.....	.....
South Carolina	81	85	.....	.....	1.10	27 00	40	61	85	100	95	100	100	101
Georgia	90	57	700	20.7	1.05	20 50	89	52	111	100	101	99	94	99
Florida	120	55	700	42.5	.....	.....	200	50	.....	.....	.....	.....	.....	.....
Alabama	107	59	337	43.6	1.20	18 50	148	64	118	100	156	101	.....	.....
Mississippi	105	74	.....	.....	1.27	20 25	113	71	98	108	60	100	.....	.....
Louisiana	86	71	.....	.....	1.20	17 50	.....	.....	.....	.....	.....	.....	.....	.....
Texas	120	79	725	26.2	1.50	12 75	95	71	118	106	98	107	116	109
Arkansas	119	75	650	15.2	1.18	16 00	76	65	148	110	95	100	.....	.....
Tennessee	85	67	675	6	1.25	15 50	80	53	112	102	95	100	91	102
West Virginia	114	1 13	775	9.3	1.10	14 00	81	68	108	101	97	99	.....	.....
Kentucky	78	85	730	7.2	1.23	13 00	73	52	107	102	95	100	.....	.....
Ohio	77	1 48	1,000	5.5	1.05	14 61	86	64	107	107	99	99	97	96
Michigan	.....	.....	.....	.....	1.15	14 00	.....	.....	108	106	100	105	105	101
Indiana	76	1 17	700	6	1.25	11 50	85	54	102	102	98	100	98	102
Illinois	110	1 47	775	9	1.25	8 75	61	57	118	103	86	97	.....	.....
Wisconsin	.....	.....	.....	.....	1.30	9 50	75	68	.....	.....	.....	.....	.....	.....
Minnesota	.....	.....	.....	.....	1.38	5 60	68	68	.....	.....	.....	.....	.....	.....
Iowa	69	1 55	.....	.....	1.25	6 25	71	58	.....	.....	.....	.....	.....	.....
Missouri	76	1 80	800	8.8	1.25	9 50	94	52	119	114	95	105	98	103
Kansas	57	1 35	.....	.....	1.30	3 90	85	48	.....	.....	108	90	.....	.....
Nebraska	.....	.....	.....	.....	1.40	4 50	71	65	.....	.....	.....	.....	.....	.....
California	123	1 13	.....	.....	1.37	16 50	.....	.....	.....	.....	.....	.....	.....	.....
Oregon	.....	.....	.....	.....	1.40	10 50	.....	.....	.....	.....	.....	.....	.....	.....

Table showing the relative percentage of numbers and prices of farm stock in January, 1874, as compared with the returns of January, 1873.

States.	HORSES.					MULES.					MILCH COWS.	
	Total number of horses compared with that of January, 1873.	Average price per head under 1 year old.	Average price per head between 1 and 2 years old.	Average price per head between 2 and 3 years old.	Average price per head over 3 years old.	Total number of mules compared with that of January, 1873.	Average price per head under 1 year old.	Average price per head between 1 and 2 years old.	Average price per head between 2 and 3 years old.	Average price per head over 3 years old.	Total number of milch cows compared with that of January, 1873.	Average price per head at this time.
Maine	100	$32 50	$54 75	$81 63	$113 50	.....	.....	.....	.....	.....	104	$37 50
New Hampshire	100	29 60	51 60	79 00	110 70	.....	.....	.....	.....	.....	103	38 00
Vermont	100	28 60	49 33	73 66	106 00	.....	.....	.....	.....	.....	100	35 50
Massachusetts	101	40 00	66 70	95 00	142 50	.....	.....	.....	.....	.....	98	45 00
Rhode Island	100	38 50	67 33	98 33	132 00	.....	.....	.....	.....	.....	99	41 66
Connecticut	99	34 50	61 25	87 50	127 50	.....	.....	.....	.....	.....	100	42 50
New York	100	38 20	63 67	92 54	125 50	99	$40 42	$67 80	$110 00	$140 00	98	30 50
New Jersey	100	53 77	88 43	122 65	150 85	101	43 75	76 25	115 00	161 44	100	45 75
Pennsylvania	102	40 11	68 33	98 08	130 02	100	46 80	76 59	114 45	146 58	102	33 25
Delaware	100	38 00	60 00	80 00	115 00	100	40 00	62 50	83 00	118 00	96	33 50
Maryland	100	39 33	61 50	83 88	112 50	99	45 00	65 00	105 00	133 37	100	31 60
Virginia	102	29 68	49 49	74 86	100 50	101	38 12	59 59	94 17	120 00	100	22 00
North Carolina	100	38 47	59 02	81 64	103 26	102	43 64	66 22	93 62	117 18	99	15 59
South Carolina	102	36 00	60 43	87 50	115 80	100	45 00	70 50	106 00	127 35	102	21 88
Georgia	99	38 50	61 40	84 20	110 50	100	44 25	71 67	102 24	120 60	100	18 54
Florida	99	37 82	64 50	90 87	124 33	97	46 00	70 50	106 50	127 38	96	14 32
Alabama	99	30 52	50 96	70 64	98 50	99	40 00	60 00	87 60	114 00	98	19 50
Mississippi	101	30 00	48 20	72 50	102 60	100	34 13	52 40	86 10	120 47	100	21 58
Louisiana	101	22 00	34 66	52 83	93 33	103	36 66	55 33	83 33	117 50	97	20 70
Texas	104	15 40	23 10	34 13	52 00	106	25 30	36 75	54 33	75 80	93	15 25
Arkansas	101	25 80	37 50	58 18	84 00	101	31 75	50 28	77 13	105 00	101	17 75
Tennessee	103	38 80	56 30	77 50	97 50	103	43 40	66 50	95 00	112 00	100	21 86
West Virginia	101	27 09	42 25	61 09	87 50	104	33 45	53 55	78 00	106 00	103	27 50
Kentucky	100	29 30	43 76	58 55	82 61	99	37 93	57 50	81 50	100 13	100	26 46
Ohio	100	34 17	53 80	76 75	103 81	99	36 59	58 43	87 40	111 42	99	29 57
Michigan	102	30 00	49 52	76 69	102 75	99	33 67	54 67	80 67	108 50	100	30 50
Indiana	101	28 50	44 46	62 20	85 66	95	34 41	52 85	75 69	101 65	99	29 62
Illinois	101	26 92	41 18	59 94	82 00	98	30 53	50 15	72 74	102 50	102	30 03
Wisconsin	100	30 71	46 73	65 38	97 00	97	37 69	55 23	78 50	106 68	104	26 28
Minnesota	107	30 48	48 06	72 55	105 90	102	34 44	52 37	76 20	107 67	108	26 27
Iowa	102	27 81	42 11	62 66	88 49	97	34 72	52 00	76 50	103 35	106	26 50
Missouri	103	21 25	34 00	49 64	68 75	100	30 26	45 86	66 00	90 01	104	22 45
Kansas	111	23 00	35 70	53 33	76 26	110	29 62	45 75	67 28	95 75	108	25 30
Nebraska	119	27 70	46 87	69 50	101 66	108	36 40	55 73	84 54	118 00	109	29 50
California	93	20 38	30 35	43 82	71 44	92	19 60	32 50	50 50	84 61	115	35 28
Oregon	107	19 00	27 71	39 37	63 57	94	18 33	26 66	36 50	60 83	105	24 42

Table showing the relative percentage, &c.—Continued.

States.	OXEN AND OTHER CATTLE.					SHEEP.			HOGS.		
	Total number of oxen and other cattle compared with that of January, 1873.	Average price per head under 1 year old.	Average price per head between 1 and 2 years old.	Average price per head between 2 and 3 years old.	Average price per head over 3 years old.	Total number of sheep compared with that of January, 1873.	Average price per head under 1 year old.	Average price per head over 1 year old.	Total number of hogs compared with that of January, 1873.	Average price per head under 1 year old.	Average price per head over 1 year old.
Maine	107	$12 33	$21 75	$35 40	$64 28	108	$3 12	$4 02	97	$8 83	$17 58
New Hampshire	100	10 40	20 00	34 60	62 60	103	3 40	4 20	90	10 20	20 80
Vermont	98	9 00	16 50	30 00	55 50	90	2 65	3 90	92	7 95	14 50
Massachusetts	101	11 20	20 80	35 60	64 50	102	3 00	4 40	97	11 00	18 75
Rhode Island	95	12 00	18 66	34 00	63 00	92	3 40	4 60	95	11 80	19 50
Connecticut	97	12 00	21 00	33 67	62 00	103	4 05	4 50	97	11 40	19 25
New York	97	8 64	16 71	27 54	44 40	97	2 75	3 57	97	5 96	13 04
New Jersey	99	12 81	22 00	33 63	49 00	100	4 83	5 24	99	8 60	15 35
Pennsylvania	101	9 40	16 36	27 50	40 50	99	2 30	3 50	95	5 10	11 20
Delaware	95	9 50	15 25	21 50	33 50	85	3 00	4 00	102	6 50	7 75
Maryland	100	9 75	15 00	22 50	34 20	103	3 68	4 67	97	4 79	9 90
Virginia	100	6 82	11 96	19 00	27 97	95	2 40	3 07	92	2 75	5 80
North Carolina	100	3 87	6 50	10 26	15 20	95	1 16	1 68	97	2 17	4 93
South Carolina	103	5 20	8 75	12 35	17 50	99	1 40	2 00	97	3 00	6 77
Georgia	101	4 20	7 40	11 15	15 18	93	1 20	1 72	96	2 25	4 90
Florida	100	4 50	6 75	10 35	14 00	97	1 20	2 18	101	1 89	4 09
Alabama	97	5 50	8 00	12 20	18 00	102	1 16	2 04	103	2 12	5 16
Mississippi	98	4 60	7 60	12 00	19 00	92	1 47	2 08	92	2 75	5 70
Louisiana	96	4 10	6 50	9 88	15 75	88	1 14	1 94	85	2 20	6 25
Texas	85	3 15	5 45	8 36	12 00	108	1 36	2 24	93	2 12	5 10
Arkansas	102	4 33	7 20	11 00	17 50	110	1 41	2 15	90	2 03	5 69
Tennessee	101	6 25	9 00	13 60	21 50	94	1 58	2 26	89	2 39	5 20
West Virginia	103	8 10	15 80	22 74	34 52	99	1 88	2 73	95	2 82	6 28
Kentucky	99	7 66	13 17	22 03	35 67	98	2 00	2 75	95	2 40	5 90
Ohio	98	9 40	16 25	27 00	40 30	100	2 00	3 10	91	4 35	9 12
Michigan	101	7 66	14 48	24 00	41 24	102	1 77	2 71	94	3 68	8 12
Indiana	102	7 75	14 36	17 50	37 28	96	2 00	2 87	92	3 22	7 95
Illinois	101	9 68	16 75	26 06	39 20	101	1 85	2 76	92	4 11	8 50
Wisconsin	101	7 47	13 35	20 85	34 73	103	2 00	2 85	94	3 41	7 41
Minnesota	105	7 75	13 84	23 72	37 95	104	2 10	3 05	96	3 60	8 35
Iowa	104	9 10	15 61	24 80	35 50	98	1 55	2 66	96	3 60	8 50
Missouri	103	6 63	11 66	18 48	29 40	98	1 29	2 11	98	2 40	6 00
Kansas	111	6 73	13 00	19 50	28 29	196	1 35	2 30	106	4 00	8 52
Nebraska	120	7 29	13 67	23 67	37 56	107	1 40	2 50	106	3 17	8 52
California	97	9 20	14 58	22 17	29 47	117	1 73	2 51	105	5 05	9 50
Oregon	106	6 14	11 80	17 75	26 14	105	1 96	2 68	105	1 80	4 00

CONDITION OF WINTER-GRAIN.

A voluntary return of the condition and comparative area of winter-grain has been quite general in connection with the regular returns of this season of the year, relative to numbers and prices of farm-stock. The indications are more than usually favorable, both for a larger area in wheat and a better promise of vigorous and healthy growth. The early-sown was, in some counties in Maryland, attacked by the fly, and in Virginia the sowing was often too late for a vigorous start before cold weather set in; but the real difficulties there, as indicated by correspondents, are mainly poor preparation and fertilization of the soil, well-cultivated fields yielding three times the general average. In the South a larger area in wheat is indicated; its growth is generally vigorous, so much so in many instances as to be fed down by cattle; and in the Carolinas and Tennessee frequent reference is made to better preparation of the soil.

The condition of winter-grain in the great wheat-growing States is generally good, with an apparent increase of area more than equaling the annual increase of population. In some counties of Illinois the chinch-bug pest is still prevalent. A more general use of the drill is apparent, and some indications of progress in the direction of better culture. The open winter may affect the promise unfavorably.

WINTER-WHEAT.

MAINE.—*Androscoggin:* Injured by worms.

PENNSYLVANIA.—*Armstrong:* Never looked better. *Butler:* All sown in due season, and looks excellent. *Chester:* Looks quite promising. *Bucks:* Looks remarkably well. *Lycoming:* Looks very promising. *Erie:* Unusually good.

MARYLAND.—*Saint Mary:* All wheat sown in September has been attacked by the fly. *Washington:* Looks promising; no fly has yet made its appearance. *Anne Arundel:* Very fine, but rumors of much fly in early-sown. *Baltimore:* The late excellent wheat-crop encouraged farmers to plant a large area this fall. The early-seeded is seriously injured by the Hessian fly in some localities. The area sown is estimated at about 21,000 acres.

VIRGINIA.—*Buckingham:* Presents an unpromising appearance; one-third of the crop not yet up; about one-tenth of the area intended for wheat has not been sown. *Henrico:* Looking badly; making a poor start. *New Kent:* In many cases the late-sown is not yet visible. *Campbell:* Unusually late in being sown, and therefore makes but little show at present. *Middlesex:* Looking rather badly on account of a cold, wet fall; considerably damaged by fly, especially very early crops. *Northumberland:* Sowed late, mostly without fertilizers, and has made but little growth. *Orange:* The very cold autumn and late sowing on many farms explain the very poor show of wheat; the worst, perhaps, ever known; where seeded at the proper time it looks well. *Amelia:* Wheat here chiefly follows tobacco; this crop was late. Wheat, of course, was put in late; a bad spell of weather followed, so that much is not yet up; have never seen the crop look worse. *Fluvanna:* The condition as good as, or better, than usual. *Page:* Ten per cent. above last year's crop is sown in wheat, owing to a favorable fall and the extra exertion of us who are determined to work. *Prince William:* Wheat (average yield 8 bushels) will yield 25 to 35 bushels per acre in this county on lands in a good state of fertility, well cultivated. *Pulaski:* Promising. *Caroline:* The fall has been propitious for wheat. *Essex:* Fultz best; about 8,000 acres sown. Area would have been larger but for late corn, (a majority of farmers sowing corn-land.) That seeded late did not come up well. *Floyd:* Looks favorable. *Prince George:* Owing to the difficulty of procuring labor and to the extremely sickly season, many large farmers did not sow as much wheat as usual, but the deficiency has been more than made up by the number of small farmers who have seeded for their own consumption. *Rockingham:* About one-tenth of the farming land is in wheat at this time. *Dinwiddie:* We are generally sowing a larger area this season; the growing crop looks much better than it did last autumn. *Montgomery:* An exceedingly fine season for winter-wheat. Many farmers are pasturing it, thinking the growth excessive. *Bath:* Looks well. *Madison:* Later than usual, but the season favorable and it is improving.

NORTH CAROLINA.—*Jefferson:* The farmers are improving their wheat-crop very

much by preparing their land and getting better seed. The dry fall has caused the crop to look weakly and bad at present. *Person:* Not so much sown by 25 per cent. as in the last crop; the prospect rather bad. *Davie:* The young wheat is showing a fine stand and growth. *Hertford:* Not yet above the surface; the quantity seeded being below the average. *Mitchell:* The high price of seed-wheat is one reason why the area sown is not so great as last year.

SOUTH CAROLINA.—*Somers:* More attention than usual is given to manuring wheat, selecting good seed, and plowing it in with as much care as in the best Virginia wheat-fields. This is due to the low price of cotton. *Marion:* Now being sown; more than an average area. *Newberry:* Sowing backward; that sown in October looks well.

GEORGIA.—*Carroll:* A large amount being sown. *Dawson:* Sown earlier than last year and looks well. *Johnson:* Have not finished sowing yet. *McDuffie:* More sown this fall than any season since the war; the stand and appearance excellent. *Clayton:* Farmers very late in sowing wheat, and always will be when they plant so much cotton. *Lee:* Coming into notice in small plantings. *Fulton:* An increase sown; the prospect promising. *Hart:* Sowing just commenced; only a small area will be planted, because of scarcity of seed. *Douglas:* Not so much sown as last year, owing in part to scarcity of seed, high price, and no money to buy.

ALABAMA.—*Henry:* More attention than heretofore will be given to the cultivation of wheat. *Calhoun:* There will be 25 per cent. increase in acreage over last year; the crop not yet up; unusual care has been taken in putting it in. *Franklin:* Impossible to estimate the condition, as much of the crop is not yet up. *Randolph:* More sown and sowing than for years; some are using cotton-seed as manure.

TEXAS.—*Blanco:* Owing to the destruction of small grains by grasshoppers, and their appearance again this fall, farmers have sown comparatively little fall wheat; intend to sow a larger quantity of spring wheat than usual. *Burnet:* Farmers not inclined to sow as wide an area of small grains as formerly. *Collin:* Never looked better; that sown early will have to be pastured heavily, which will save much feed. *McLennan:* In consequence of the appearance of the grasshoppers in the counties west of this, and the general apprehension of their coming here, many were late in sowing wheat. *Navarro:* The acreage very small. *Red River:* Acreage largely increased; has not grown as rapidly as usual, but is improving. *Coryell:* Much larger acreage than last fall, and in fine condition. *Dallas:* Never looked more promising *Hill:* Increased at least 15 per cent., and I never saw it look better during the eighteen years I have resided in the State. *Cooke:* Twice as many acres sown as last year, and it looks very fine. *Ellis:* The stand and appearance better than for the last five years; will pay well as a winter pasture. *Titus:* The area sown much greater than any former years; more than 200 per cent. greater than last year. The condition of the early sown compares favorably with last year. *Wood:* Area fully double that of last year, and the condition fine. *Bandera:* Very little sown, owing to scarcity of seed. *Bexar:* Ten inches high, and looks well. *Kaufman:* Very promising. *Lamar:* Looks very fine indeed. We hope to harvest our own flour-bread next year. *Upshur:* A large quantity has been sown; more than ever before, and more yet would have been if seed could have been procured. *Grayson:* The season more favorable to the crop than for several years, and it looks very fine.

ARKANSAS.—*Arkansas:* Very little sown for want of seed. *Franklin:* Area put in wheat ten times the average since 1862. Looks remarkably well. *Little River:* It would have perhaps been nearer the truth to put the area of winter-wheat at ten times that of last year, instead of five, but not having exact data, I have put it at five to be within bounds. *Prairie:* At least double last year's quantity of wheat has been sown, and more would have been, had not the cost of seed been so great. *Independence:* More than 100 per cent. more wheat sown than last year. *Baxter:* The most favorable fall for wheat-sowing for the last ten years, and much more has been sown. *Columbia:* Almost all the farmers have abandoned raising wheat; a few have commenced to sow again this year; seed-wheat sells at $2.50 to $3 per bushel. *Fulton:* Season favorable; crop looks well. *Benton:* The finest fall for sowing wheat for may years.

TENNESSEE.—*Greene:* The area sown would have been increased but for wet and cold weather setting in unusually early. More pains taken with the crop than heretofore. *Lincoln:* A larger area and more pains in the preparation of the soil than in 1872; good stands, looking healthy and well. *Smith:* Has come up well, and the weather is fine. *Bradley:* All in, and what is up looks well. Twice the acreage of last year. Farmers turning more attention to wheat and less to corn. *Blount:* Very large breadth sown. *Cannon:* Late sown, but good stand, and looks well; acreage at least 10 per cent. above an average. *Jefferson:* Generally put in in better condition and in better time than usual; looks remarkably well. *Macon:* Generally sown late; backward; seed-wheat inferior. *Monroe:* Some of the farmers have prepared their ground for wheat better than usual. *Sullivan:* A fall favorable for the growth of wheat has brought it forward finely, wet and cool weather preventing the ravages of the fly; heavier manuring and better cultivation have inspired the belief that our

next crop will be a good one. *Wayne:* Not yet done sowing. The late sowing of wheat in this county is doubtless one cause of so small a yield, (five bushels per acre,) as those who sow early generally reap from ten to twenty bushels per acre. *Wilson:* One-third more area sown; looks well.

WEST VIRGINIA.—*Braxton:* Looking well. *Marion:* Looks very well: much better than usual at this season. *Mercer:* Sown late to avoid the grub-worm; looks rather bad.

KENTUCKY.—*Taylor:* The small quantity sown was owing to the protracted drought this fall; impossible to break up the ground; sown a month too late; hence the low condition. *Lincoln:* Season very favorable for the sowing of small grains. *Spencer:* The drought prevailing till the middle of October caused much of the wheat to be late in sowing. *Jackson:* Condition equal to or better than that of former years. *Hardin:* Has made but little growth. *Shelby:* Owing to repeated failures in the years preceding the last two, our farmers had become somewhat discouraged, but the partial success of the last crop has induced them to increase the acreage. I estimate the extent in the county at 10,000 acres. *Russell:* At least 25 per cent. more sown than usual; stand good, and looking very fine.

OHIO.—*Noble:* Good crop sown and looks well. *Franklin:* Unusual breadth sown, and it looks remarkably fair. Very early fields injured somewhat by the Hessian fly. *Medina:* More than usual put in, and put in well. *Vinton:* The prospect better than for fifteen years. *Montgomery:* Fall very favorable for sowing winter-wheat; looks much better than usual. *Williams:* Looks very well. *Adams:* Never saw wheat look so well at this season. *Coshocton:* The acres sown will approximate 27,000, and the prospect was never better. *Crawford:* More than average amount sown; looking well. *Erie:* Has not looked so well for years. *Geauga:* Looks very fine. *Delaware:* The most favorable season for many years; increased acreage and looking unusually well. *Morrow:* Almost universally sown earlier than usual, and to a great extent drilled in; looks remarkably well.

MICHIGAN.—*Calhoun:* Never looked so well, except in the fall of 1871, which preceded the best crop we ever raised both in quantity and quality. *Oakland:* Looking finely when it was in sight; well covered with snow now. *Tuscola:* Has gone into winter quarters in good condition; covered with about a foot of snow. *Washtenaw:* Looks remarkably well, (under the snow.) *Wayne:* Never looked better. *Barry:* Got a fair start; the season favorable; the ground has been covered with snow two or three weeks and not frozen. *Cass:* The fall and winter very favorable for the young wheat.

INDIANA.—*Switzerland:* Fifty per cent. more sown than in 1872. *Dubois:* Looks very well. Farmers are drilling more and more every year. *Grant:* Looks unusually well. *Franklin:* Has generally a good start, and seems free from the fly. *Harrison:* A majority of our farmers prepared the land better; are using more manure and drilling more than formerly. *Brown:* Dry weather in August and September prevented the usual crop from being sown; 30 per cent. less than average sown; looks well. *Fountain:* Prospect for a splendid yield. *Marion:* Looking well. *Stark:* Early sown; looks extremely well.

ILLINOIS.—*Clark:* The increased acreage sown this fall is safely put at 50 per cent.; many prominent farmers put it at 100 per cent., and such is the fact in some districts, but I think not for the whole county. *Ford:* Our farmers are turning their attention more to this crop than in years past. *Wabash:* Looking unusually well. *Bureau:* Looks well. *Saint Clair:* Was never put in in better order, and more was sown than usual. The early sown is attacked by myriads of chinch-bugs. *Tazewell:* Looks splendid. *Franklin:* The fall was favorable for sowing, and very much more has been sown than last year. It has a very fine appearance. *Effingham:* Growing finely. *Mason:* The area is no greater than last year, but there is a disposition to sow more spring-wheat then there has been for some time. Since the corn was gathered there has been a goodly number of acres plowed for sowing wheat next spring.

IOWA.—*Fremont:* Owing to the drought we could only sow fall grain in spots where there were showers. *Louisa:* Owing to the extreme drought of the fall but little plowing was done, and, consequently, but a limited amount of wheat was sown. The same cause retarded the growth.

MISSOURI.—*Douglas:* Looks better than for many years past, and at least 25 per cent. more sown. *Mercer:* After a drought of four months, a nice shower, about the close of November, brought the wheat out finely. *Franklin:* Far above average in acreage and condition. *Caldwell:* Very good. *Franklin:* The best prospect I ever saw at this season of the year. *Maries:* The fall the best for years for plowing and seeding to wheat. *Laclede:* Looks better than for years. *Adair:* Ten per cent. more sown than in 1872; condition above average. *Moniteau:* Exceedingly promising. *Greene:* Never looked better; many fields have too rank a growth. *Holt:* In good condition. *Caldwell:* Looking healthy. *Texas:* Looks better than I have ever seen it at this time of the year; the ground now completely covered. *Platte:* Greatly injured by the grasshoppers and grub-worms; also by the long-continued drought through

which we are now passing. *Crawford:* Looks the best of any crop for a long time. *Lawrence:* Looking much better than for the last eight years. *Carter:* The prospect better than ever known at this season. *Jasper:* Having been sown (mostly drilled) much earlier, and the ground much better prepared than usual, and the fall being very favorable, the prospect is very flattering. *Shelby:* Looks very fine; at least one-fourth more than usual sown. *Clay:* Promising. *Harrison:* A very dry fall has injured the small grain. *Nodaway:* Looking well. *Phelps:* Has been rather dry for wheat, but it looks tolerably well; about 6,500 acres sown. *Perry:* Increased acreage, and put in in superior order.

KANSAS.—*Miami:* Indications good. *Lincoln:* Looks very poor, owing to the long drought since sowing. *Marshall:* A large per cent. sown very late. *Bourbon:* Was being injured by dry weather, but a warm rain, November 24, brought relief. *Riley:* The grasshoppers and dry weather discouraged wheat-sowing. *Cherokee:* Looks unusually fine; sown earlier and the ground in better condition than usual. *Douglas:* Has suffered for want of rain, but in fair condition now. *Coffey:* Looks well, with a double amount sown. *Franklin:* That sown early looks promising; a considerable portion was sown late and is backward. *Jackson:* Quite thin on the ground, but looks well. *Lyon:* The drought since seeding has damaged the crop somewhat, but recent rains have improved it. *Neosho:* Put in early and in better shape than ever before, (mostly drilled;) looks well. *Osage:* The long-continued drought has considerably damaged the wheat crop. *Washington:* That sown in the middle of August looks well; that sown late has not had rain enough to germinate. *Woodson:* Uniformly above an average. *Wabaunsee:* Acreage greater than last year, but the great drought has reduced the prospect 50 per cent. *Ottawa:* But a small acreage sown, and that badly damaged by the dry fall. *Reno:* Looks very well, except where it was eaten by grasshoppers, on the outer edge of the field. *Smith:* In the north part of the county, looks well; in the south part, very bad.

NEBRASKA.—*Nemaha:* But little sown on account of drought. *Nuckolls:* Poor.

CALIFORNIA.—*Sonoma:* But little sown as yet, owing to want of rain. Should the season be favorable, a very large acreage, greater than ever before, will be sown. *San Luis Obispo:* No winter-seeding has yet been done, on account of having no rain. *Amador:* No rains to date; a large area of wheat being put in by "dry-sowing." *San Joaquin:* More surface covered this fall with wheat than ever before. Prospect good for a large crop. *Tuolumne:* As there has been no rain, the winter-wheat has not started. *Mendocino:* The rains have just commenced, and no wheat has yet been sown. *Butte:* As the rain is late this year, the sowing-season will begin in December and will last till March, and later if March should prove a wet month. *San Bernardino:* No rain having fallen, but little grain is yet sown, and that on such lands as are susceptible of irrigation, and light sandy soils, which latter is called "dry-sowing." *Stanislaus:* Not yet up. First rain of the season November 28.

OREGON.—*Clackamas:* The dry fall has retarded the growth of all kinds of winter-grain; but the season for sowing winter-grain here continues from the 1st of September to the 1st of March, and, as we have ample time yet to put in a large crop, I feel well assured that the harvest of 1874, in this county, will be much larger than ever before. *Douglas:* Have had hardly rain enough to moisten the ground sufficiently for plowing; consequently very little winter-grain is yet sown. Not more than half the area sown last year will be this. *Tillamook:* Looks better than usual, with a larger acreage than last year. *Columbia:* Our farmers are putting every available acre into wheat, on account of the failure in the potato crop.

UTAH.—*Morgan:* The autumn has been so dry it was impossible to plow, except bottom-lands soaked by the river; therefore there is not sufficient winter wheat, rye, or barley sown to report. *Kane:* Winter-grain has not been sown, owing to the land being too dry to plow. *San Pete:* Not so good as last year, on account of the long dry weather. *Salt Lake:* A much larger breadth sown than in any previous season.

IDAHO.—*Nez Perce:* The fall has been too dry to sow winter-grain.

ARIZONA.—*Maricopa:* Owing to the low prices this fall, there will not nearly so much grain be sown as last year.

WASHINGTON.—*Walla-Walla:* As the fall has been remarkably dry, but little plowing and seeding has been done so far, though we look for an open winter, and expect to plow during most of it. *Clallam:* In the fall of 1872, 250 acres sown; 300 this fall.

WINTER-RYE.

MAINE.—*Androscoggin:* Injured by worms.

CONNECTICUT.—*New London:* In excellent condition.

PENNSYLVANIA.—*Butler:* All sown in due season and looks excellent.

MARYLAND.—*Washington:* Has a good appearance.

VIRGINIA.—*Northumberland:* Very little seeded; does not do well here. White rye seeded two years will become almost black. *Caroline:* But little yet up. *Floyd:* Looks favorable. *Montgomery:* An exceedingly fine season for winter-rye.

NORTH CAROLINA.—*Jefferson:* The dry fall has caused the crop to look weakly and bad.

SOUTH CAROLINA.—*Marion:* Now being sown; perhaps less than an average area. *Newberry:* Sowing backward. That sown in October looks well.

GEORGIA.—*Johnson:* Sowing not yet finished. *McDuffie:* More sown this fall than any season since the war. The stand and appearance excellent. *Lee:* Increased quantity sown. *Fulton:* Increased area sown, with promising prospect.

FLORIDA.—*Levy:* More being sown than usual, and sown earlier.

ALABAMA.—*Henry:* More attention will hereafter be given to the cultivation of rye.

TEXAS.—*Coryell:* Smaller acreage than last fall. Mostly sown for winter-pasturage and turned under in the spring. *Dallas:* Never looked more promising. *Titus:* Area a little above that of last year. Sown deeper than heretofore to insure against winter-killing. *Bandera:* Very little sown, owing to scarcity of seed. *Kaufman:* Very promising.

TENNESSEE.—*Bradley:* Claiming much more attention than heretofore. *Monroe:* More attention given to the growing of rye.

WEST VIRGINIA.—*Mercer:* Sown late to avoid the grub-worm. Looks rather bad.

KENTUCKY.—*Spencer:* The drought prevailing till the middle of October caused the rye to be late in sowing.

ILLINOIS.—*Stephenson:* Has got a very meager growth, owing to the dry fall. *Bureau:* Looks well. *Tazewell:* Looks splendid. *Edwards:* Almost all the rye sown is for pasture.

MISSOURI.—*Mercer:* A nice shower about the last of November brought out the rye finely. *Nodaway:* So universally pastured in the fall that it does not look as well as the wheat.

KANSAS.—*Lincoln:* Somewhat better than wheat, as it is hardier and not easily injured by drought.

WINTER-OATS.

VIRGINIA.—*Henrico:* Doing very well; near the city, winter-oats, sold in the sheaf, are more profitable than hay, bringing nearly as much per ton, and yielding sometimes, over four tons per acre. *Middlesex:* Looking remarkably well.

SOUTH CAROLINA.—*Marion:* Now being sown; more than an average area. *Newberry:* Sowing backward; that sown in October looks promising.

GEORGIA.—*Johnson:* Sowing not yet finished. *McDuffie:* More sown this fall than any season since the war; the stand and appearance excellent. *Liberty:* Sown pretty extensively; our farmers are sowing oats at this time and will continue to do so until March. *Early:* Now mostly sown and up, with an increase of 10 per cent. in acreage.

FLORIDA.—*Levy:* More oats than usual being sown, and sown earlier than usual.

ALABAMA.—*Henry:* More attention will hereafter be given to the cultivation of oats. *Laraca:* Coming into notice and pay well to cultivate.

TEXAS.—*Grimes:* The cultivation assuming large proportions, but mostly for forage without thrashing. The kind known as the anti-rust-oats is the only one giving promising returns. *Bandera:* Very little sown, owing to scarcity of seed. *Kaufman:* Very promising.

WINTER-BARLEY.

TEXAS.—*Dallas:* Never looked more promising. *Titus:* Area, a little above that of last year; condition, average. *Bandera:* Little sown, owing to a scarcity of seed. *Kaufman:* Very promising.

TENNESSEE.—*Monroe:*—A few farmers are sowing some barley this fall.

INDIANA.—*Franklin:* Has generally a good start and seems free from the fly.

ILLINOIS.—*Tazewell:* Looks splendid.

CALIFORNIA.—*Amador:* No rains yet; a large area of barley being put in by "dry sowing." *San Joaquin:* More surface covered this fall with barley than ever before; prospect good for a large crop. *Tuolumne:* As there has been no rain the winter-barley has not started. *Mendocino:* The rains have just commenced and no winter-barley has yet been sown.

EXTRACTS FROM CORRESPONDENCE.

PROGRESSIVE FARMING.—*Macon, N. C.*—Since the war agriculture with us has made decided progress, which is shown by the introduction of better implements, more through tillage, and the now rapidly-extending cultivation of clover. Unfortunately our clover is badly mixed with ribbon-grass. We need clean seed.

Walker, Ala.—The prospect of an improvement in the agriculture of this section is very flattering. The distribution of improved seeds from the Department of Agriculture, and the practical skill of a few good northern and English farmers are waking up quite an interest in this important industry.

Clarke, Ala.—Sorghum and sugar-cane are raised in a small way. More will be planted next year, and crops will be more diversified.

Fayette, Tenn.—Two encouraging symptoms have exhibited themselves in this county this year; farmers sowed grass during the summer. and are now sowing wheat. A diversity of crops, it is hoped, will prevail in a few years.

Woodson, Kans.—The wheat sown indicates a falling off in acreage from last year; but this is owing to the fact that the farmers are cultivating fewer acres and farming them better—giving to six acres the labor formerly expended on ten—plowing deeper, harrowing well, and drilling in the grain. This method of cultivating, together with early sowing, shows largely in the good condition of winter wheat, as it is now uniformly above an average.

AGRICULTURAL CHANGES AND DIVERSIFICATION.—*Pettis, Mo.*—Wheat-raising is on the decline and stock-raising on the increase; therefore, corn, oats, and other feeding-grains are invariably from 5 to 10 cents per bushel higher in the country portion of the county than at Sedalia, a shipping-station on the Pacific railroad, of 8,000 inhabitants.

Knox, Tenn.—There is a commendable spirit of enterprise growing up in this county. Many farmers' clubs have already been organized for the discussion of questions of practical value and for the interchange of opinions founded on individual observation and experience. These meetings are well attended and are increasing in numbers and interest. A few granges have been organized. Altogether our people are making progress, and I think they owe much to the Department of Agriculture.

Gadsden, Fla.—The corn-crop of this year (average 13 bushels per acre) is a little above the average of former years, but no indication of what the land is capable of producing, if our farmers could be induced to abandon an old and universal prejudice against *thicker* seeding. The prevailing custom is to have the rows five feet and the stalks of corn three feet apart in the drills, and but one stalk in a hill, thus securing only 2,940 stalks to the acre. The idea is that in our climate it is necessary to give great distance between the stalks to prevent the *firing* of the leaves. Convinced that this idea is erroneous, and that the firing complained of is occasioned, not by overcrowding, but by injudicious cultivation, I have made two experiments, both of which proved successful. I selected a four-acre lot of high oak and hickory ridge-land, which was cleared in 1842, and had been annually cultivated in cotton and corn ever since without any interval of rest. For several years anterior to the experiment the average yield of this lot had 15 bushels per acre, one handful of cotton-seed to the hill being used for a fertilizer. This lot was thoroughly broken up in the month of February, and about the first of March it was checked both ways with a narrow shovel-plow, 3½ by 3 feet, (giving 4,200 hills to the acre,) and one grain of corn dropped in each check. The fertilization was the same as in previous years, one handful of cotton-seed to the hill. In the intervals between the hills of corn on the drill I deposited one ground-pea immediately after the first working. The cultivation was done exclusively with Allen's "horse-hoe," running once in each alley and three times successively, at intervals of twenty-one days between each plowing. The result was a yield of 45 bushels of corn and 620 pounds of fodder to the acre, besides a good crop of ground-pease, upon which my porkers were fattened, and an abundant supply left for the rooting of the stock-hogs. The past season I added two acres to the lot, and observed the same programme as to distance and fertilization; but, owing to the blowing down of the corn after the first working, I was unable to give it any further cultivation; consequently the yield was reduced to 35 bushels per acre. In both experiments the ears were large and fully developed, and in neither case was there any indication of *firing*. I design to repeat the experiment annually until I shall have ascertained the maximum number of stalks that the land will sustain.

McDuffie, Ga.—The low price of cotton will make a great change in the farming interest of this section; more wheat, oats, and rye sown this fall than in any season since the war, and a large area will be planted in corn in the spring.

Cobb, Ga.—The decline in the price of cotton in November caused farmers to sow larger crops of wheat this fall than in former years. The high prices of corn and wheat have also had their influence.

Fulton, Ga.—The stringency of the money-market and low price of cotton have forced many of our farmers to stop following the flowing tide to financial ruin in planting nothing but cotton. There is a great change; we are now endeavoring to raise more grain; an increase of wheat has been sown this fall, the soil well prepared for its reception, and the results look very promising. The same is true of rye and barley.

Marion, Ga.—For the first time since the war, farmers are turning their attention to raising grain. There will be more small grain sown this fall in this county than in

any year since 1864, and a great deal more would have been sown but for the want of seed. The reason of this change is found in the uncertainty of labor. As to the freedmen, they do not like to be employed in repairing farms, but want to frolic in idleness from the time the crop is gathered until planting. They cannot be persuaded to take any interest in stock, only to kill and eat, and that by stealth.

Oglethorpe, Ga.—There is a large increase in the acreage in wheat, and will be, I think, in the acreage in corn next spring. The financial condition of the country has caused our farmers to turn their attention more to the production of provision-crops and less to cotton.

Wilkes, Ga.—More disposition to sow grain. The money-panic caused some to say they will change the practice and, hereafter, plant more corn and less cotton; but a high price of cotton in the spring would run them wild again.

Butler, Ala.—Cotton crops short; prices short; hard times; I think the planters will sow, next spring, a great deal more grain than ever before in this county. They will pay more attention to cereals and less to cotton.

Franklin, Ala.—There is really nothing raised here worth estimating except corn and cotton—the latter being the all-absorbing crop. There is now, however, a very general disposition to raise wheat, clover, etc. The very rapid deterioration of lands under the present system of farming has convinced every reflecting man that a change is a necessity.

Barbour, Ala.—There is a very general disposition, this fall, to sow wheat and all kinds of grain. Heretofore rye and barley have been sown for pasturage only, no seed being saved.

Lowndes, Miss.—Unfortunately we, as farmers, have devoted ourselves exclusively to the production of cotton. It is the custom of the county to buy all the horses and mules used, and but few cattle and hogs and very few sheep are raised. The changed condition of labor, and the high prices for cotton which have prevailed, have caused other crops to be made secondary to this specialty. The failure of the cotton has well nigh bankrupted the farmers this year, and will teach the wholesome lesson that an agricultural people must diversify their products, if they will become permanently prosperous.

Spartanburgh, S. C.—It is ruinous for our belt of country to purchase all their supplies with cotton. We never shall be prosperous under this system. A few "panics" may bring our people to raise their own supplies.

Putnam, Fla.—There is no doubt that we can raise our meat, horses, and mules cheaper than we can raise cotton with which to purchase them. The farmers generally see it in this light, but it takes time to get men out of an old groove which they have run in so many years; and then the hog and cattle thieves are arrayed against the change in this, that their thieving discourages stock-raising.

Douglas, Ga.—The farmers are not so well off, generally speaking, as they were twelve months ago. Fertilizers and provision bills secured by crop liens have pretty well absorbed the cotton crop, and left nothing to pay old debts with. Our farmers must turn over a new leaf. Before relief comes they will have to make their own fertilizers, and raise their own meat and bread, and therefore give less attention to cotton.

Wabasha, Minn.—Very much of the land heretofore planted to wheat is being cultivated to grasses, which are found to flourish much better than was expected a few years ago. Fewer acres of wheat are planted yearly as the country grows older.

Franklin, Vt.—The tendency, mentioned in my report a year ago, to reduce stock, for the purpose of selling hay for shipment, is more apparent this season than ever before, especially among the small farmers and dairymen.

AGRICULTURAL RECONSTRUCTION NEEDED.—*Hanover, Va.*—The unsettled condition of the business of agriculture in this part of Virginia is scarcely yet mitigated. The reports we have to make by no means represent the agricultural capacities of the region in a state of affairs even approaching a normal one. The disturbing influences are not particularized, being beyond the reach of the Department; but the decided amelioration afforded by the efforts of the Department at distributing seeds, and in disseminating facts and theories, is plainly recognized.

Upson, Ga.—The agricultural prospect in this section is quite gloomy; cotton, our leading product, has fallen in price below the cost of production. Before the war we grew cotton at 10 cents per pound. The increase and growth of our slaves was our chief income, but, having perfect control of the labor, we were enabled to make good crops. We now grow large cotton-crops, but it is at the expense of our grain-crops. In Crawford County, a few days since, a gentleman stated to me that there was neither meat nor corn in the county to supply the people sixty days. In Upson we have about four months' supply of corn, and perhaps three of meat. Our people have devoted themselves almost exclusively to cotton-growing, and depended entirely on buying their supplies of corn, flour, meat, molasses, sugar, tobacco, and last, though not least, commercial manures, to the utter neglect of producing any manures upon their farm. This kind of farming has been experimental, and has failed. Our people are all left badly in debt, and consequently despondency is felt throughout the land. Large numbers of farmers and

planters have abandoned their farms and embarked in other pursuits. A stranger passing through our section would be wonder-struck at the desolation and waste he would see all along the highways. Our labor system amounts to no system at all. Where proprietors have remained upon their farms, and have had the patience and fortitude to superintend in person, they have done well; but where they have been left to the control of tenants, (white or colored,) loss rather than profit has resulted. The negro is not yet capable of taking charge of a farm and conducting operations to a success. In almost every case, even where he owns the land and stock, he has failed of success. It has now become plain that, to succeed, we must diversify our crops; grow our own supplies of corn, meat, flour, and manures. Then we shall be sure not to over-stock or glut the cotton-market, and, consequently, always to realize remunerative prices for the crops. Such a diversified system would advance the interests of the freedmen and all laborers, as well as proprietors.

Clayton, Ga.—Our people are not yet done gathering their cotton. A great many have not commenced sowing their wheat, and they will not, probably, get through before Christmas. If our farmers would plant only half the amount they do in cotton, and put double the amount in corn, wheat, and oats, it would, undoubtedly, be much better for us. We can raise in this county 30 bushels of wheat and 50 bushels of corn per acre, and if the same interest taken in raising cotton were taken in raising grain, we should raise our own supplies, and cotton-money would be a surplus. But, as it is, it takes all our cotton-money to buy our corn, bacon, and guano, and, so, at the end of the year, we are generally as poor as we were in the beginning, and some of us poorer.

Lowndes, Miss.—Profiting, I hope, by the sad experience of the present and past years, we are starting to prepare for another crop, with a determination to curtail expenses and diversify crops.

Page, Va.—We have a great lack of farm-labor. Our boys and young men, with few exceptions, desert the labor of the farm and turn their attention to other pursuits less useful and much more demoralizing.

King and Queen, Va.—I hope the steady decline of our Virginia tide-water lands has reached the bottom. Good lands, worth since the war $10 to $15 per acre, are now selling at $5 to $6. Want of reliable labor, and the abandonment of the farm for almost any other kind of work, are the causes of the low state of agriculture.

Iberia, La.—Not ten planters in the parish have raised a sufficient quantity of corn to winter their stock, and not one-fourth of the remainder have made a sufficiency for bread for their families. Notwithstanding these facts, the negroes who have been working on shares, and who change about almost every year, are bringing in their proportion of the crop and selling it at $1 per barrel, the average price in more prosperous times. Like his more assuming and pretentious employer, even the negro has saddled himself with debts, to pay which he must rob his family of bread. The immediate future of our parish and State is most disheartening.

FARM-STOCK.—*Sullivan, Tenn.*—Many fattening hogs are sick with the so-called cholera. Considerable numbers have died. The kidneys, so far as examined, appear to be the seat of the disease, being of a bruised, bloody mass, the leaf-fat surrounding them showing an unhealthy condition. Give us a remedy if you can.

Livingston, Ky.—There have been a good many deaths among hogs from a disease like cholera, though it presents itself in various forms. Some have lost nearly all their pork. A strange disease has occurred also among horses. One of my neighbors lost four, all he had; but he believes the first three died from eating green sorghum He turned them into it in the green state, and he thinks that killed them.

Spencer, Ky.—The hog-cholera still exists sporadically, no other disease prevailing among stock.

Montgomery, Md.—The hog-disease is still raging in portions of this county. Many young hogs have died from it.

Nueces, Tex.—It is becoming more evident every year that cattle-raisers will have to purchase and confine their stock instead of letting them run loose and stray where they will. Wherever land has been inclosed and not overstocked, the grass is magnificent, and the owners are pasturing beef-cattle for parties who have no pastures at about 25 cents, gold, per head per month. A few days since Mr. Kennedy, of the Laurells ranche, who has a pasture of about 145,000 acres fenced in, imported a number of Durham bulls to cross with our native stock. This is a step in the right direction. The first cross is a great improvement; other parties will have to do the same or pay the penalty for their lack of enterprise with heavy losses in winter and lower prices for their poorer stock. Our people seem to be awakening to the idea of more farming and fewer cattle-ranches. If they would but study the climate, and plant more in the fall and winter, they would succeed better. Ripe tomatoes, fresh from the garden, and cucumbers from the vine, also green pease, were served in Corpus Christi Christmas-day. Two crops of Irish potatoes, also two crops of corn and beans, can be grown in one season, and all we want is skilled and enterprising labor to make this a farming as well as a stock and wool growing region.

Putnam, Mo.—A disease called "quivering" is prevailing among hogs, and in some localities they are dying quite rapidly. No remedy has yet been discovered.

Cherokee, Tex.—Why is it that in a season when bitter mast is plenty, many hogs have kidney-worms? I have several now down with them. They first commence to stagger on the hind legs, then break down entirely in the loins, and drag the hind legs on the ground until they become wholly disabled, when they starve. I refer to hogs in the woods.

Jefferson, Ga.—The unusual severity of last winter and the general want of comfortable protection for all cattle, resulted in a loss of at least 10 per cent. of the cattle in this county, and of about 5 per cent. of the hogs. It is lamentably true that few farmers think of stabling their cattle or preparing comfortable quarters for their hogs or sheep, but let them take the rigor of the weather as it comes. Hence a corresponding loss after a severe winter.

Sonoma, Cal.—The remarkable decrease in the number of horses in this county (84 per cent. compared with one year ago) is worthy of note, inasmuch as it indicates the prevailing conviction among farmers of the necessity of ridding themselves of a lot of mustangs, which are a nuisance on the farm. They eat as much feed as serviceable work-horses, without any equivalent of usefulness. Our farmers are paying much more attention to raising good horses. The lands and pastures are now mostly fenced, so that owners of mustangs are compelled to either feed and care for them, or sell them for what they can get. Much attention is also paid to the improvement of cattle, sheep, and hogs, by crossing with fine imported stock. This and the adjoining county of Mendocino are noted for producing the finest wool in the State. The large increase in the number of milch cows (175 per cent.) is owing to the fact that many potato farmers on the coast are giving up this crop as unprofitable, and devoting their farms to dairies, which experience has proved to be more profitable than raising cultivated crops, wherever the location is adapted to this branch of business.

Franklin, Ind.—The raising of mules, which a few years ago was common here, has almost ceased. Farmers are coming back to the use of the horse generally. An experience of twenty years with mules makes us prefer the horse for general purposes.

Alameda, Cal.—There has been the heaviest fall-clip of wool ever produced in the State. The most of it is now in market, but the sales have been very limited, and at reduced prices. Stock is generally looking thin, and some farm-animals are dying for want of feed. The old grasses, in large sections of the State, have become extremely short, and for the want of rain the new feed has not come forward as usual. Cattle have been and are suffering more than other kinds of stock.

FARMING AIDED BY OTHER INDUSTRIES.—*Montcalm, Mich.*—Corn, oats, and hay have not been so low for years as now, on account of a decrease in the business of lumbering. Owing to the tightness of the money-market, there is but very little being done in that line this winter. Flat River runs through this county. Last winter 200,000,000 feet were put into this river. This winter, the highest estimate is 20,000,000 feet.

Tazewell, Ill.—Have given the prices of cereals, &c., at the river-towns, which is 5 to 6 cents higher than at the railroad-stations.

Ogle, Ill.—The beet-sugar factory at Freeport, Stephenson County, is running in full force, day and night, and is manufacturing a large amount of sugar of superior quality. The beets this year are very good, but not enough beets were produced to supply the demand. The superintendent thinks he will get a sufficient quantity next year, as those who cultivated them this year are greatly encouraged. More manufactories, such as beet-sugar, corn-starch, and cheese factories, &c., are needed in the West, to manufacture its bountiful crude products into condensed marketable commodities, and thus diversify industry and create a good home-market.

MISCELLANEOUS.—*Hanover, Va.*—The average yield of corn and tobacco is much reduced by the numerous small crops, or attempts at crops, of the freedmen. Their cropping is generally nearly abortive.

Labette, Kans.—One farmer, by way of experiment, cultivated and harvested from one acre over 120 bushels of good, ripe pea-nuts, which he says will bring in the market over $1 per bushel.

Steel, Minn.—The Osaka wheat was sown largely last spring, as the results of the two previous sowings had been very favorable. That sown early and put in well, generally turned out well—from 20 to 30 bushels per acre; but that sown late resulted badly, some pieces not being worth cutting. The Scotch Fife, after many years of remarkably successful crops, was thought to be running out; but it proved the past season as good as ever. In fact I have not heard of a single failure of it. Early-sown grain invariably did the best, which accords with the general experience in previous seasons.

Northampton, Pa.—The wheat and rye look well; the favorable fall caused these crops to spring up early, covering the ground like rich meadows, upon which we have been pasturing our cattle for fear of the grain getting too heavy a top. This is always done with us, care being taken not to put cattle on in wet weather. A heavy top with a deep snow on causes the wheat to rot; hence we resort to pasturing.

Ripley.—Last year our county exported 200 bales of cotton; this year it will export over 500 bales.

Franklin.—Cotton is our principal crop and is exceedingly good; 25 per cent. in advance of the previous year, and the yield at least 110.

McLennan, Texas.—One-fourth of the bottom-land cotton yet to be gathered; paying $1.25 in gold per 100 pounds for picking. In consequence of a large area planted, and an unprecedented yield, together with a scarcity of hands with which to secure the crop, it has been badly done, and the bulk of the crop will class "*ordinary*," or even lower. Much less cotton will be planted next year.

Fresno, Cal.—The cotton crop has averaged about 800 pounds of lint-cotton per acre, and about 250 acres matured. Some 60 acres were destroyed by grasshoppers. The area of land planted to cotton will be trebled next season. A few jute-plants, which came up from seed obtained from the Department, grew splendidly, and attained the height of 10 feet. The seed did not generally come up. I think this climate suited to its culture.

Clackamas, Oreg.—We have as good varieties of wheat in this county as can be found in the world. The following are standard varieties: Old White-Winter; White Velvet; Canada Club; Chili Club; White Australian, Spring and Winter, and Ninety-day wheat. The Old White-Winter was brought to this country by the Hudson Bay Company, not less than 40 years ago; and for every variety of soil is probably the best kind we have. Some of the other varieties were obtained through the Department of Agriculture. The good that has grown out of its distribution of seeds can scarcely be told. This county is indebted to that source for some of its most valuable seeds, which otherwise might have been years in reaching here.

Lamar, Texas.—Our best farmers produced greatly above the figures given, (for the average per acre of grain,) but the slothful and lazy farmers have to be considered, which greatly reduces the average, and this year makes it very low for this county. This being a hard year, grain would not grow, even in Texas, without the necessary culture.

Assumption, La.—A remarkable decrease in the yield of sugar-cane has been noticed for several years past, the largest yield now being 1,500 to 2,000 pounds per acre, whereas formerly the yield often reached 3,500 pounds.

Cheshire, N. H.—The farmers in the valley of the Connecticut are running their farms with tobacco, and in consequence of the heavy drain on the land by the crop, and of remunerative prices, are fast putting the farm into the pocket by running the land out.

Douglas, Minn.—The Agricultural Association of this county is hereafter to be controlled by the farmers. They have elected their officers. It is expected that the next fair will contribute more to the success of agriculture than those heretofore.

Hancock, Ohio.—The failures in our cereal crops are owing entirely to the season. No devouring insects; losses to farmers fully made up by the shipment of 100,000 barrels of apples from this county. The "panic" does not hurt us much, and really we are in a prosperous condition.

Saint Clair, Ill.—The panic is not felt in this county to any considerable extent. As our farmers are free from pressing indebtedness they are holding back their crops, and it is supposed (correctly too) that they are advancing on their hands. Enough of wheat is disposed of to keep our mills continually running, and first-rate flour finds a ready market, with a larger margin than usual. All our people are doing well.

Logan, Ohio.—The frequent droughts and consequent partial failure of the crops of late years is a subject worthy the consideration of all interested in American agriculture. I believe the principal cause is to be found in the loss of our timber. The history of all inland countries which have been denuded of forests goes to prove this. The wonderful change in the climate of Egypt since the most extensive planting of forests that we have on record speaks volumes on this subject. Were 25 per cent. of our cleared lands replanted with forests, there is little doubt that the remainder would produce more than the whole does now; and how might the country be enriched by the growth of valuable, selected timber!

Seneca, N. Y.—We have a new variety of white winter-wheat, discovered by Mr. G. Clawson, of this town, (Ovid,) four years ago. It is a red-chaff bald wheat, long open head and stiff straw. It has proved more hardy than any other white wheat in this vicinity, and is superseding all others.

Martin, Minn.—The Cherokee corn deserves particular mention for the size and filling of the ears and the yield per acre. The seed was brought here from Dane County, Wisconsin.

Prince William, Va.—Mr. Waters, of Brentville, seeded on six acres six bushels of buckwheat, intending to turn the crop under as a fertilizer; but as it promised a good yield he harvested it, and it gave him 274 bushels, which he sold at $1 per bushel. He applied 10 cwt. of bone-meal.

Santa Anna, N. Mex.—The farmers have made molasses this season out of the common corn-stalk.

Granville, N. C.—Stock of all kinds has been decreasing in numbers every year since the war, but more rapidly than previously for the past two years. Very few freed-

men will work for wages, most of them renting land and working an ox or cow. Consequently they make but little crop and raise no stock. Most of them move every year. With few exceptions the stock of every kind is raised by white people here, and not being able to hire help they have been compelled to reduce their stock, and are likely to continue to do so.

Perry, Ala.—Horses and mules range very low in price on account of the scarcity of money and unprecedented emigration of the colored laborers to Mississippi. Unless white labor comes into this county and into the prairie belt of lands, an unheard-of decrease of acreage in cultivation will take place the coming year. To show the prospects, I will refer to two rentings for the present year: 800 acres of prairie lands, as good as any land in the county, rented for $75; 500 acres of good prairie land rented for $80; good improvements on each place. Rents will not pay taxes.

Prairie, Ark.—The financial troubles have compelled speculators to throw their lands on the market, and the consequence is that land is nearly as low as in 1850. Immigration seems to be coming in rapidly, and all appear to be satisfied with the country.

Attala, Miss.—The agricultural prospects of Attala are pretty good. The agricultural industry is mostly made up of small farmers, who are themselves inured to labor and are doing very well under the improved prices of all products—though "the panic" has now greatly deranged the prices of everything, reducing them nearly one-third, except of corn, which remains the same as last year, that is, $1 to $1.25 per bushel. Our corn will have to be supplied from other States.

Freedmen are purchasing all kinds of property and the most industrious prefer farming for themselves. The refuse and jobbers can only be hired by the day or week, and must have their pay each day or week, as the case may be. Labor is scarce and commands high prices, the jobbers making as much as $3 per day in many instances, which is spent for groceries and liquor. The incoming year promises to be one of great hardship and distress among the more opulent debtors as well as the poorer classes. Among agriculturalists the remedy is to be found in strict economy—make more money and spend less.

Hempstead, Ark.—The agriculturists in this county devote all their attention to cotton as a market product, and only a small percentage attempt to raise any farm-stock beyond a meager supply of milk-cattle. Hogs cannot be raised on the range, owing to their being stolen by the freedmen. Corn is too costly a crop to feed them much with that. Planting is evidently about "played out." The old rush for hands is all past, and land-owners seem to be indifferent as to whether hands, that is, negroes, occupy their lands or not. There is a growing demand for white men, and a white man who is honest and will work can make his own terms. A few negroes seem to be making some money, but by far the larger part, as it seems to me, are retrograding.

Cedar, Mo.—The failure of banks and the almost total absence of money in this section have compelled farmers to hold their stock and produce. Many who have purchased with a view of selling the past fall have to hold and feed over, notwithstanding the great scarcity of feed. This state of affairs has produced a stringency and hardship upon the masses, the like of which has never been known here. The farmers in the, perhaps, vain hope of ousting those in high places to whom they ascribe a great part of their calamities, are organizing granges in nearly every school district, and their strength is only limited by their ability to get means to pay an initiation fee.

Box-Elder, Utah.—Since the branch line of the Utah Northern Railroad has reached Corrine, on the Beaver River and on the line of the Central Pacific, our trade in produce with the far west has greatly increased. Prices, however, have changed but little, though we have a little more money than formerly among our population.

It becomes more apparent every year that satisfactory crops of wheat and other small grain can be raised here without any irrigation at all, which in time will become a matter of great importance to surrounding sections that hardly know rain.

Holt, Mo.—In the northern end of the county apples and peaches were destroyed by the severity of last winter; the first failure of apples for thirteen years. The southern end produced a fine crop, owing to its peculiar position. It is evident that lands there will, in time, become invaluable for supplying fruits to the bleak northwest, though now the price is almost nothing—not exceeding $5 per acre.

Antelope, Neb.—The first white man settled in this county in August, 1868. The first plowing was done in the spring of 1869. Now we have 300 farms opened, 2 saw-mills, 1 flouring-mill, and another building, and enterprise and thrift on every side.

Clinch, Ga.—Sugar-cane is planted extensively here, and will produce 10 barrels of sirup per acre, 40 gallons to the barrel, worth 50 cents per gallon. Upland rice is also planted here, and the average yield per acre 20 bushels, worth $1.25 per bushel.

York, Me.—The season now closed has been a favorable one for farm-labors. A large amount of fall-plowing has been done; most of the summer manure moved; fields smoothed, &c. Since the era of high taxes, capitalists have not been willing to let money to the farmers; few expensive improvements have been made, and the result is that the farmers of this county were never so free from debt as now.

Levy, Fla.—The season has been more favorable for crops than for several years previous. There was enough corn made to supply the home demand if it were distributed, but we are so favorably situated to get supplies from New Orleans that it does not pay to haul corn a long way unless it can be bought for less than $1 per bushel, and farmers are not inclined to sell at less than that. Corn from New Orleans can be delivered anywhere along the railroad and coast for less than $1, but farmers prefer to pay that for country corn, for it is always sold on the ear in the shuck, a flour-barrel of ears being counted a bushel and good corn will shell from one to four quarts over a bushel to the barrel.

The cotton-crop is turning out better than was expected when it was first struck with the rust. The yield in this county is far ahead of last year. The crop is mostly of the black seed long-staple, though there was more than usual of the grey seed short-staple planted. That did well in some lands. The long-staple does the best on light sandy land, and the short on the heavy clay lands. Long cotton is selling at Bronson in the seed at 3 cents per pound cash; 6 cents in trade.

Kemper, Miss.—The corn-crop is very short, and corn will have to be shipped from the west if farms are to be cultivated the ensuing year. My impression is that many of the laborers employed this year will find it difficult to get employment next. They have generally worked badly. As they work on shares they do not consider the time lost as affecting the employer, and they are not disposed to hire for wages, although the result would be favorable if they worked as they should. The crop of cotton in this county will probably be equal to that of last year, owing to a greater breadth of land in cultivation.

FLAX.—*Warren, N. Y.*—Flax has nearly become one of the products of the past, since it requires more hand-labor than farmers can make profitable in raising it.

Ford, Ill.—Flax has become a favorite crop with our farmers, at $1.60 per bushel for the seed. It seems to promise more than corn, besides a mill here gives us a ready market for the straw.

Portage, Wis.—A good deal of flax was sown for the seed only; the yield is eight to ten bushels per acre. Price, $1.50 per bushel.

Stearns, Minn.—Flax is becoming a staple with us. It will be extensively sown another year. Average yield this year 20 bushels of seed per acre; price, $1.30.

Moniteau, Mo.—Flax is becoming an important crop for the seed alone; but it impoverishes the land so much that I am trying to discourage its culture.

Bates, Mo.—Many of our farmers tried flax for the first time and find it a decided success, some crops yielding 22 to 25 bushels of seed per acre.

Cass, Mo.—There seems to be an inclination to sow flax for seed.

Franklin, Kan.—Flax-seed has been sown the last two years, and those who have tried it speak favorably of it as a paying crop.

Washington, Neb.—Black crickets destroyed the flax-seed to such a degree that we are discouraged about raising it.

RECENT PROGRESS IN AGRICULTURAL SCIENCE.

[It has been thought desirable to present a succinct yet comprehensive statement of the results of the later investigations in applied science, so far as they relate to agriculture, and the following, by Prof. Wilbur O. Atwater, of the Wesleyan University, at Middletown, Conn., whose fitness for the work may be deemed in some respects unequaled, is submitted, in the hope that intelligent farmers may make a profitable application in daily practice.—ED. REP.]

It is our purpose to give a description of some of the more important phases of the later progress and present status of agricultural science, especially in the application of chemistry and physiology to the study of the laws of animal and vegetable nutrition and growth. The production of animals and plants being the chief purpose of agriculture the laws of their production constitute a most important part of agricultural science.

AGRICULTURAL EXPERIMENT STATIONS.

It is in the experiment stations in Europe, particularly in Germany, that the larger part of the latest research has been made. These are chemical and physiological laboratories, situated generally in more or less direct connection with a farm, garden, or stable, or all of these together, where men of the highest scientific skill are engaged in investigating the effects of different manures and methods of culture upon the growth of different crops, or the effect of various kinds of fodder upon domestic animals, and more especially in the study of the more abstruse laws of nutrition in animals and plants.

Some thirty-eight years ago Boussingault commenced on his farm at Bechelbronn, in France, a series of researches in agricultural chemistry and physiology which have become classic. Five years later, Liebig, in Germany, began his remarkable work in agricultural chemistry. Two years thereafter, Lawes, aided by Gilbert, commenced in England a series of experiments which are still in operation, and are quite famous. Under the patronage of the Highland Agricultural Society of Scotland, and the Royal Agricultural Society of England, Voelcker, Anderson, Way, and others, have done much for agricultural chemistry.

In 1851 the first German experiment station was founded at the instigation of some prominent agriculturists, and with the aid of the Leipsic Economical Society on the farm of the society at Moeckern, near Leipsic. So useful were its labors and so great was the interest thereby awakened that others were soon established, governments, agricultural societies, and private persons uniting in their support. In 1856 there were, in Prussia, 7; in Saxony, 3; in Hanover, 3; and in Bohemia, 2. In 1858 the investigations made in the stations, had become so extensive that it was found advisable to establish a journal for their publication, *Die Landwirthschaftlichen Versuchs-Stationen.*

The success of these stations in Germany has led to their establishment in other countries.

In 1867 the French government, through its minister of agriculture, sent M. Grandeau to examine the German stations. On receipt of his report steps were taken for the founding of stations in France. Similar procedures have led to the establishment of stations in Italy and Belgium.

According to the latest accessible data, the present number of establishments which may be classified as experiment stations, including those connected with agricultural schools and those maintained by private individuals, is approximately, as follows:

In Prussia, 23; Saxony, 7; Bavaria, 4; Other German states, 6; Austria, 9; Italy, 11; France, 5; Switzerland, 1; Belgium, 1; Holland, 1; Sweden, 2; England, 1; total, 71. The objects of these stations are:

1st. The study of the laws of animal and vegetable production, taking this expression in its widest sense, so as to include not only the sciences of chemistry and physiology, as applied to the nutrition and growth of plants and animals, but also zöotechny and meteorology in their relations to agriculture.

2d. Investigations and analyses of soils, waters, and particularly of fertilizers. The analyses of commercial fertilizers constitute a very important part of the work of the stations. In Germany these are sold at prices based upon their chemical composition. They are warranted by the seller to contain certain percentages of valuable fertilizing in-

gredients, as nitrogen, phosphoric acid, and potash. The stations working in the interest of the buyers test their composition by analyses, and thus farmers are enabled to guard against imposition and secure good wares. The control thus exercised by the stations upon these prevents a very large amount of fraud in the trade of these articles, and causes a great improvement in the general character of the fertilizers sold in the regions where the stations exist. The saving by this means to the agricultural communities amounts to many times the whole cost of the stations.

The stations consist in general of a chemical laboratory, connected with experimental fields, garden, or glass-house, for experiments in vegetable production, or, when the nutrition of animals is the object of investigation, with stables, and in some cases a respiration apparatus.

By examining the character and results of some of the researches in these stations we shall be best able to learn somewhat of the present condition of the science of animal and vegetable production.

Experiment stations for researches in animal physiology.—So far as the writer is aware, almost no descriptions of the plan and results of the most important of the later investigations in this subject have appeared in the English language. An admirable résumé of the subject, by Wolff, of the station at Hohenheim, in Würtemberg, may be found in Mentzel & Von Lengerke's Landwirthschaftlicher Kalendar, Berlin, 1872. Among the stations which have been most active in this line of investigation are those of Weende and Halle, in Prussia, Moeckern and Leipsig, in Saxony, and Hohenheim, in Würtemberg. These experiments may be divided into four classes:

1st. Experiments in which chemical analyses are made of the fodder given to the animals, and, in case of milch cows, of the milk produced; while the investigation of the excrement, urine, and gases given off in respiration is omitted. Experiments of this sort are of great value in deciding what are the most economical kinds, mixtures, and amounts of food for different domestic animals, as horses, cattle, sheep, and swine, according as the production of meat, milk, labor, &c., are required of them. They do not tell what proportions of the different foods are actually digested, nor do they give any direct explanation of the nutritive processes that go on, nor of the ways of formation of fat and flesh in the animal body.

To this class belong many well-known feeding experiments, made by Lawes & Gilbert in England, whose results have already been made known to the English-reading public.

Of still greater importance are the experiments made within a few years past in the German stations, on the composition and amount of food needful for the sustenance of cattle and sheep, and upon the effects of different kinds and amounts of food given to milch cows upon the amount and quality of the milk produced.

Experiments on the effect of different kinds and quantities of food on the amount and quality of the milk produced.—The most important investigations of this subject have been made since 1866 at the stations at Moeckern by G. Kuehn and Hohenheim by Wolff & Fleischer, on cows, and at the station at Halle, by Stohmann, on goats.

The general plan is to feed the animals for a certain period with a certain ration; then for another period with a different ration; to make accurate measurements and analyses of the food and of the milk produced, and thus note the effect of the different kinds and quantities of food upon the milk.

In some experiments the rations fed out in the different periods are

the same in quality, and differ only in the amount. The object of these experiments is to learn what amounts of different foods may be most profitably fed, when not only the amount, but also the quality of the milk is taken into account. In others, the rations differ in composition, the object being to determine whether an increase or decrease in the proportion of albuminoids, fat, or starch in the food will cause an increase or decrease in the proportion of albuminoids (casein) or fat (butter) in the milk.

As an example of experiments of the first sort we have a series made in Moeckern, (Vs.-St., 1869, xii, p. 114,*) in which four cows were fed with rations consisting of hay, barley-straw, turnips, and rape-cake. In one period the daily ration consumed contained an average of 19.34 pounds of organic substance per 1,000 pounds live weight; in the other, 22.36 pounds. Each period continued some three weeks, and the milk was carefully measured, and was analyzed nearly every day.

The increase in the ration, amounting to about 17 per cent., was attended by hardly any increase in the amount of milk, although, with the richer feeding, the milk contained a slightly larger percentage of organic substance. The composition of the latter was essentially unaltered.

In another series performed at Moeckern (Vs.-St., XII, 1869, p. 197) was studied the effect of varying proportions of albuminoids, fats, and carbo-hydrates on the proportion of albumen (caseine) and fat in the milk produced.

Two cows received as a normal fodder during one experiment a moderate ration of meadow-hay, to wit, 20 pounds per head, containing about 1.5 pounds albuminoids, 8 pounds carbo-hydrates, and 0.5 pound fatty matter. To this was added, in experiment 2, 0.7–0.8 pound of albuminoids, in the form of rape-cake, for the one cow, and bean-meal for the other; in experiment 3, 2.3 pounds of starch; in experiment 4, 1 pound rape-seed oil; while in experiment 5 the 20 pounds of hay were fed alone. These experiments were performed in successive periods. In order to make up for the natural depression in amount and change in composition in the milk, with advance of time from calving, the above order was followed with one cow and the same inverted with the other.

Here follows a tabular statement of the average result. In order to compare the composition of the dry substance in different experiments, the composition shown by analysis is reckoned on a uniform percentage of 12 per cent. of dry substance.

Kind of food.	Hay.	Hay and albuminoids.	Hay and starch.	Hay and oil.	Hay.
Daily amount of milk produced ..... pounds	16.15	15.90	14.68	15.47	13.02
Containing dry substance ..... per cent.	13.25	13.18	13.33	12.88	13.24
Equivalent to milk of 13.25 per cent. dry substance	16.15	14.80	14.58	14.34	13.02
Dry substance on basis of 12 per cent. in milk contained—					
Fat ..... per cent.	4.18	3.95	3.88	3.85	3.99
Albuminoids ..... do	2.74	2.92	2.88	2.80	2.86

It appears from the above figures that the variation in the proportions of albuminoids, carbohydrates, and fats of the food had as good as no effect on the relative amounts of these in the milk.

* Vs.-St. Die landwirthschaftlichen Versuchs-Stationen. Organ of the German Experiment-Stations. Dr. F. Nobbe, editor. Published at Chemnitz, Saxony.

As the result of these and other experiments, conducted with the greatest accuracy and involving many hundreds of analyses of fodder and milk, Kuehn concludes that, as soon as the amount of the ration exceeds a certain minimum, an increase is without effect upon the quality, and exercises only a slight influence upon the quantity of the dry substance of the milk produced.

This principle, first enunciated by Kuehn, has been confirmed by an extended series of experiments of similar character made in Hohenheim by Wolff & Fleischer. (Henneberg Journal für Landwirthschaft, 1871, No. 4.)

As in the Moeckern experiments the series were divided into periods, in which different rations were fed out, the latter varying from 21 pounds of dry substance, containing 2.3 pounds of albuminoids, to 31 pounds, containing 7.4 pounds of albuminoids. These changes in the fodder were accompanied by corresponding changes in the condition of the animals, as shown by their looks and weight. There was likewise a variation in the quantity of the milk, the difference between the largest and smallest averages being some 7.4 pounds per day. It was also found that the milk given when the animals were in better condition was not only larger in quantity, but was also richer—contained a larger percentage of dry matter, of organic substance.

The composition of this dry matter, the relative amounts of casein, fat, sugar, and mineral matters, remained unaffected. Indeed, as is shown by, perhaps, thousands of analyses in these and other experiments, the composition of the milk is less affected by the food than by other circumstances, as the time of the "heat" and the advance of time from calving, and particularly by individual and race peculiarities.

It is worthy of note, however, that Kuehn (Vs.-St., XVI, 1873, 221) finds that certain foods seem to cause a slight increase of fat in the milk, an effect which Wolff is inclined to attribute rather to the individual peculiarities of the animal.

These results are quite well accounted for by the view which Voit, the well-known physiologist in Munich, has of late propounded, (Zeitschrift für Biologie, vol. v, 1869, p. 79,) and with apparently great justice, as to the mode of formation of milk by the lacteal glands in the udder: "It was formerly the general belief that the system of lacteal glands was simply a filter of large surface which allowed the passage of certain constituents of the blood, (those which make up the milk,) and that consequently, the quantity and quality of the food may determine the quantity and quality of the secretion, (milk,) as is the case of the urine which is filtered from the blood by the kidneys." He says that this is not the case, however, but that the milk, instead of being filtered out of the blood by the lacteal glands, is made of the lacteal glands themselves. "The lacteal glands prepare the fluid in their cells, or rather the milk is the gland dissolved. The milk is not a product of the activity of the glands; it is the glands changed to a liquid form. * * The milk is essentially this organ liquified by fatty degeneration. * * * An influence of the food upon the milk is to be expected only when the lacteal glands are first affected. These need albuminoid matters for the structure of their cells. The albuminoids of the food are efficient only in forming more of these cells in the glands, which in part degenerate into fat, and in part take up fat from the blood."

In this view it is easy to see that when the cow is well fed and in good condition, there will be plenty of food for the formation of lacteal glands, and hence a plentiful production of milk, and that the composition of these would not be easily affected by variation of the composition of the

food within ordinary ranges; and hence, why it should be so difficult by changes in the food to effect any change in the composition of the organic substance of the milk.

The practical inferences from these researches are thus summed up by Kuehn: "The farmer will then infer that with milch-cows the richest fodder is not always the cheapest. On the other hand too meager fodder is still worse. * * * * Here, as elsewhere, a fair mean will be found best." As regards the effect of different foods on the composition of the milk, he says that the farmer may not hope by variation in the fodder to change a "butter cow" to a "casein (cheese) cow." He must rather depend for the quality of the milk, the relative richness in fat or caseine, its special fitness for butter-making or cheese-making, upon the peculiarities of different breeds or different individuals, and for quantity upon the peculiarities of the animals themselves; or, in few words, for quality of milk, select proper breeds; for quantity, good milkers; and feed well but not over-richly.

2d. *Experiments to determine the proportions of different foods that are digested by different animals.*—In these not only the food but also the excrement is accurately measured and its composition determined by analysis. Of the food consumed by the animal a portion is digested, while the rest passes off as excrement. If, then, the total amount of the food consumed, and the amounts of its chemical constituents, albuminoids, fat, carbo-hydrates, and mineral matters be known, and the same factors of the excrement be determined also, we have only to subtract the latter from the former, and we have the amounts actually digested.

A long series of experiments of this sort have been made at the station at Weende, near Göttingen. They were commenced by Henneberg and Stohman, in 1868, and have since been continued by them and by G. Kuehn, Aronstein, Schultze, Wolff, Hellriegel, Lucanus, Hoffmeister, Lehmann, Märcker, and others at Weende and elsewhere, with very important results. The accounts of these researches are to be found in the *Journal für Landwirthschaft*, published at Göttingen, and in the *Landwirthschaftlichen Versuchs-Stationen*.

Here follows a tabular statement of the mean results of sixty-six experiments made with eleven different oxen at Weende. The figures represent the average percentage of the different food-ingredients actually digested from different food-materials. They are given by Henneberg *Neue Beiträge*, Göttingen, 1872, p. 449.

Kind of food.	Amounts digested in 100 parts.				
	Total organic substance.	Crude fiber.	Fat.	Carbo-hydrates.	Albuminoids.
Clover hay	56	41	45	69	51
Meadow hay	63	63	39	63	63
Bean straw	50	36	55	65	50
Oat straw	52	59	34	44	47
Rye straw	53	60	?	?	49
Wheat straw	45	52	27	40	26?

It will be seen from these figures that the digestibility of different kinds of straw and of the woody fiber of fodder-plants in general is much greater than has ordinarily been supposed.

The digestibility of root-fruits, grains, oil-cakes, &c., has also been investigated by Henneberg and Stohmann, by Wolff, in Hohenheim, Kuehn, in Moeckern, Hoffmeister, in Dresden, and others.

The number of experiments up to the present time is much less than those with hay, straw, and other *crude fodder-materials*, as the Germans call them. The following are mean results:

Kind of food.	Amounts digested in 100 parts.				
	Total organic substance.	Crude fiber.	Fat.	Carbo-hydrates.	Albuminoids.
Potatoes	89	.....	.....	94.9	64.9
Turnips	90	.....	.....	97.7	76.8
Bean-meal, (unbolted)	93	70	99.7	94	94.6
Bran (of spelt, bearded wheat)	84.8	69.1	88.2	90.8	72.5
Rape-cakes	58.8	?	69.8	79.6	77.9
Cotton seed cakes	49.7	22.7	90.8	46.2	73.8

The digestibility of cotton-seed cakes and their consequent value as fodder is one of special interest in this country.

Wolff, by whom the experiments (four in number) with cotton-seed cakes were performed, (Vs.-St., XIV, 1871, p. 409,) remarks that "The chief value of oil-cakes is due to their large content of albuminoid and fatty substances, and it is interesting that these ingredients in cotton-seed cakes, according to direct experiments, are scarcely less digestible than in other oil-cakes. That less of the crude fiber was digested was due to the amount of leathery husks occurring with the unshelled seeds of the oil-cakes."

The effect of addition of the more digestible substances, as meal, oil, and potatoes, to rations of crude fodder, as hay and straw, upon the digestion of the latter, has also been made a subject of extensive investigations. Some of the results are as follows:

1st. As to effect of easily digestible substances, rich in nitrogen and gluten, such as cracked beans, &c. Experiments at Weende, Moeckern, and Hohenheim, indicate that the digestion of hay, straw, &c., is not essentially affected by presence of these substances.

2d. As to the effect of easily digestible carbo-hydrates, starch, sugar, and materials rich in these substances, as potatoes. The general effect of these substances when added in considerable quantities is to decrease the digestion of crude fodder-materials. For instance, in a series of experiments performed by Wolff, at Hohenheim, (Vs.-St., 1871, XIV, p. 405,) in which sheep were fed with clover-hay alone, 63.7 per cent. of the albuminoid and 51.2 per cent. of the crude fiber were digested. In succeeding periods mixed rations of clover-hay and potatoes were given, the proportion of the potatoes being increased in successive periods. The proportion of albuminoids digested from the hay in these successive periods was gradually reduced from 63.7 to 45.7 per cent., and that of the crude fiber from 51.2 to 43.3 per cent.

The practical applications of the results of the experiments of the two classes mentioned are very important. It has been seen that straw is nearly as digestible as hay. Indeed, Henneberg found that his oxen digested as much material from 20 pounds of straw as from 17 pounds of hay. There was, however, a great difference in the composition of the digested material. That from the hay contained more nitrogenous matter, albuminoids, and less non-nitrogenous matter, fat, carbo-hydrates, and crude fiber, than that from the straw. In other words, the hay furnished a diet richer in nitrogen than the straw. Straw would be too poor in nitrogen to make alone a good diet for ordinary feeding purposes. But by mixing it with some material rich in nitrogen, as clover-hay or oil-cakes, the proper proportion between nitrogenous and non-nitrogenous

constituents can be produced, and thus the digestible portions of the straw can be utilized.

Such experiments as have been described have given an insight into the amounts and proportions of these different constituents which a ration should contain in order to be the most economical in feeding, in order to give the largest amount of product in the form of meat, milk, or labor from the smallest amount of raw material in the form of food.

Knowing the amount of digestible albuminoids, carbo-hydrates, fat, &c., which the animal requires, and the amount of these which each kind of food will furnish, we can calculate what amounts and mixtures of the fodder we have will be most profitable in feeding our stock. Scores of tables of fodder-mixtures, giving amount and proportions of the more common fodder materials suitable to different animals under different circumstances, have been made out by the experimenters. They are published in a great variety of forms, and many thousands of German farmers can from actual experience testify to their value.

In the experiments thus far described, no data are obtained for the direct determination of the ways in which the various constituents of the food are assimilated and used in the animal body. A partial solution of this problem, the discovery of the laws of flesh-building, is sought in—

3d. Feeding experiments in which, in addition to the food and excrement, the quantity and composition of the urine are also determined, with a view to learning the laws of flesh building in the animal body. The great importance of these experiments depends upon the fact that the nitrogen in the urine comes from the transformation of the albuminoid constituents (flesh) of the animal body, and that under normal circumstances the amount of the nitrogen in the urine is an accurate measure of the transformation of these substances. If, therefore, on comparing from day to day the amount of nitrogen in the urine with that in the food digested, we find a deficit, we infer that it has been retained in the body, or, in other words, that the amount of the albuminoid matters of the food that has been stored away as flesh is greater than the amount of flesh consumed. If, on the other hand, the amount of nitrogen in the urine is more than was digested from the food, the inference is that the store of flesh in the body is decreasing. We have, therefore, in experiments of this sort a means of determining whether, under the influence of a given food-ration, there is from day to day an increase or diminution in the store of flesh in the animal body. We have thus a means of telling what are the effects of different food-materials on the building of flesh in the animal body.

An important and much-vexed question at the present is, Of what constituents of the food is the fat in the body built up? The solution of this, as well as of the more general question, as to what are the functions of the different constituents of the food, albuminoids, fats, carbo hydrates, and crude fiber and mineral matters in the animal economy, is sought in—

4th. Experiments which give as results complete data for computing the amount of transformation of these different substances in the animal body, in that measurements and analyses are not confined to the food consumed on the one hand, and the excrement and urine produced therefrom on the other, but also, by means of a respiration apparatus, are extended to the remaining and otherwise undetermined products of these transformations, to wit, the gases given off by respiration through the lungs and skin.

The first successful respiration apparatus was that devised by Petten-

kofer, in Munich. A second one, constructed on the same plan, but large enough for an ox to live in while being experimented upon, was put up some nine years ago in the station at Weende. A third was added in 1870 to the equipments of the station in Halle; and a fourth was put in operation about a year since at the station in Leipsic.

The apparatus consists essentially of a large chest or compartment with air-tight walls, in which is placed an animal, for instance an ox. The interior is furnished with arrangements for supplying food and water and collecting the excrement and urine. By appropriate machinery a current of fresh air is introduced through openings provided for the purpose, and, after it has supplied the wants of the animal for respiration, is conducted out, bringing with it the gaseous products of respiration, into a gasometer, where it is measured. It is then analyzed, and a comparison of its composition with that before it had passed through the apparatus shows what material has been added to it by the respiration of the animal.

We have thus from the analysis of the food, and of all the ultimate products of its transformation, a means of following out the processes of the transformation of the food in the body of the living animal, and can infer what parts the different food-ingredients play in building up the different tissues as flesh and fat, and what materials of the food and body contribute to the supply of animal heat and muscular force.

The last three classes of experiments belong almost exclusively to the last decade. The researches of the last class are, it may be said, only begun, and thus far the results have not assumed so definite a form as is the case with others. The experiments are extremely laborious and complicated. One of the experimenters at Weende lately remarked to the writer that after several years of work with the respiration apparatus, they had only learned how to manage the apparatus, the animals, and the food, and were just ready to commence a series of researches, which gave promise of success.

We hope to be able hereafter to give accounts of the details and results of these researches.

Sufficient has been said to show that although much has been done, yet the science of animal nutrition is still in its infancy. It is by such researches as these that the theory of the feeding of domestic animals is brought into the form of an exact science.

It is greatly to the credit of the German stations and a very high compliment to the wisdom of the agricultural public, by whose voluntary contributions they are largely supported, that so much labor is spent upon abstract scientific investigation. But the value of the application of the results of these researches to practical agriculture is recognized, and the German farmers put their hands in their pockets and take out the money to support these experiments, for the very simple reason that they know that "it pays."

Experiments in vegetable production.—These may be divided into two general classes:

1st. Field experiments, whose object is to determine the effects of different manures and methods of culture upon different crops in different soils.

One common plan for conducting these experiments is to lay off a field in plots, and on these to put different manures, and note the effects upon the crops raised thereon. The number of experiments of this sort made within the past two decades is very great. In general, however, while they are quite interesting, yet, as many of the investigators in the German stations say, the different factors of the experiment, as temper-

ature, rain-fall, composition of the soil, are so variable and indeterminate as to render them of comparatively little scientific value. Exceptions to this rule, however, are the remarkable experiments of Lawes and Gilbert, in which the same crops have been raised year after year on the same land, each plot receiving continuously the same manure. By thus continuing the experiments through a series of years, the sources of error are compensated and results of the highest importance obtained. The results of the experiments of Lawes and Gilbert have already been made known to the English reading public, and we forbear any description here.

2d. Experiments for raising plants in artificial soils and solutions, in order to determine what are the nutritive ingredients of the food of plants and what are their functions in nutrition. A description of the character and results of investigation in these subjects, up to the year 1869, may be found in the admirable books of Johnson, "How Crops Grow" and "How Crops Feed." We append descriptions of some later researches.

The important questions of the relation of the atmosphere and soil to the nutrition and growth of plants have been the subject of extended research in the experiment stations and elsewhere. Of special interest are the subjects of the relation of the nitrogen of the air to vegetation; the formation of nitrogen compounds in the soil, or nitrification, and the absorptive power of soils, which have also been treated most satisfactorily in the works referred to.

Experiment stations for investigations in vegetable physiology.—Among the stations where the most work in this line is done are those at Tharand, in Saxony; Dahme, in Prussia; and Hohenheim, in Würtemberg. A good example of these is the one at Tharand, near Dresden, in Saxony, whose object as enunciated in a resolution of the Agricultural Society by which it was founded in 1869, is, "to investigate scientifically the natural laws by which the culture and utilization of the plants important in agriculture are governed." (Vs.-St., XI, 1869, p. 224.)

The investigations made thus far have been, as stated by the director, Dr. Nobbe, applied to "the study of the rôle which the mineral ingredients of plant-food play in the vital processes of cultivated plants." (Vs.-St., XIII, 1871, p. 321.)

A brief notice of some of the later results of previous research may facilitate an understanding of the objects, methods, and results of the Tharand investigations.

It is only within a very few years that any reasonably exact knowledge has been attained as to what ones of the mineral elements found by analysis to exist in plants are essential to their normal growth, and what ones are accidental or superfluous.

Some of the most important data for the solution of these questions have been obtained by what is known as "water-culture." This consists in raising plants not in soil, but in water containing in solution the substances needful for their nutrition.

It is known that plants take up from the soil through their roots certain mineral matters, as lime, potash, silica, and phosphoric acid. In order to learn which of these are indispensable to the growth of the plant, an obvious plan would be to supply to the plant, during its growth, the ingredients it is known to take from the soil, varying the number and quantities of these supplied in different experiments, and noting the results. Solution in water affords a most satisfactory means of regulating these supplies. Seeds are therefore allowed to germinate in sand or moist cotton, and then suspended so that the roots may

be immersed in such solutions. By varying these solutions, from some omitting one, and from others another of the ash ingredients, and otherwise varying their composition, and noting in which one the plants attain their normal growth, it is learned which of the ingredients are essential and which are not essential to the plant's normal development.

Nearly all of the most valuable researches in water-culture have been made by German chemists, among whom Knop, Sachs, Nobbe, Siegert, Wolff, and Kuehn have been most prominent. Plants have been raised in this way as large, as healthy, and as perfect as when grown in the soil. Nobbe obtained a plant of Japanese buckwheat nine feet high, weighing, air-dry, 4,786 fold the weight of the seed, and bearing 796 ripe and 108 imperfect seeds. (Vs.-St., X, 1869, p. 1.) And Knop delights in showing his friends a young oak tree whose growth has, thus far, been normal, though its roots have only been immersed in aqueous solution.

As the general result of these experiments it appears that, besides carbon, oxygen, hydrogen, and nitrogen, which, though indispensable, are not reckoned among the mineral or ash ingredients, potash, lime, magnesia, iron, phosphoric acid and sulphuric acid are absolutely necessary for the life and normal growth of agricultural plants. Chlorine seems also to be needful for the perfect development of some plants, as buckwheat and vetches. As regards soda, it appears that but a minute amount, if any, is essential, while silica seems not to be an essential ingredient of the food of the more common cultivated plants, though Bretschneider, (Hoffmann's Yahresbericht d. Ag. Chem., 1868–'69, p. 238,) as the result of a number of experiments, arrives at a contrary conclusion. (See, also, Johnson's "How Crops Grow," pp. 167–201.)

After finding what are the essential ingredients of plants, the next step would evidently be to determine what is the especial office of each in the vital processes of the plant.

The observation was made by Gris, in 1843, and has since been substantiated by the works of numerous experimenters, that iron is needful to the development of chlorophyll in the leaves of the plant. Nobbe (Vs. St., IV, p. 339; VI, p. 111; and VII, p. 374) and Leydhecker (Vs.-St., VIII, p. 186) have shown that chlorine is necessary to the normal formation of seeds of the buckwheat-plant; that without chlorine the transfer of starch from the foliage, where it is elaborated to the flower and fruit, is impeded, while the leaves and stem become peculiarly diseased. These results are corroborated by experiments of Beyer, (Vs.-St., XI, p. 262,) while Knop has concluded, from a series of experiments with maize, buckwheat, cress, oak, and horse-chestnut, in solutions free from chlorine, that the latter element is not necessary to the perfection of the plant. (Chem. Centralblatt, 1869, p. 177.)

Of the functions of the other ash ingredients almost nothing is known. To discover what is the part which each plays in the vital processes of the plant has been the object of an extended course of experiments at the station at Tharand, which commenced in 1869, and are still in process. The chief attention has thus far been given to the discovery of the function of potash, and some very interesting results have been obtained.

Two series of experiments were carried out, one with Japanese buckwheat, (Vs.-St., XIII, 1871, p. 321,) and the other with summer rye, (Vs.-St., XIII–p. 401.)

Experiments on the function of potash in the buckwheat plant.—The questions proposed by Nobbe for solution by these experiments were—

1st. How will the plant comport itself in a solution containing all the ingredients necessary to its growth except potash, and what will be the explanation of the peculiar phenomena that may be manifested?

2d. How will the plant comport itself in solutions, each containing potash, but in different forms of combination, (as chloride, sulphate, phosphate,) and what are the causes of the relatively more or less favorable effect of these salts?

3d. Can sodium or lithium replace potassium in the performance of its physiological functions?

The method of water-culture was used for the experiments.

Plants were cultivated in various solutions. One, the "normal solution," contained all the essential ingredients, including chloride of potassium. In a second, potash was omitted; in a third, it was supplied as nitrate; in a fourth, as sulphate; in a fifth, as phosphate, while in others it was replaced by salts of sodium and lithium. In the normal solutions the plants grew normally, and reached a height of several feet. Without potash the plants were only a few inches in height, and micro-chemical investigation showed that there was no proper formation of starch in the leaves, a fact of which their stunted growth was an obvious result. The p enomena observed in the development of the different plants were very interesting. The general result of the experiments is expressed by Nobbe as follows:

1st. In a solution containing all the nutritive ingredients except potash, the plant grows as in pure water. It cannot assimilate the materials needful for its growth, and shows no increase in weight, because, without the co-operation of potash in the chlorophyll grains, no starch is formed.

2d. The chloride is the most efficient form of combination in which potassium can be furnished to the buckwheat plant. Nitrate of potash stands next. If the potassium be given only in the form of sulphate or phosphate, there appears sooner or later a very marked disease, which is due to the fact that the starch which is formed in the chlorophyll grains is passively accumulated in the leaves rather than carried away to be utilized in the development of the plant.

3d. Potassium cannot be replaced physiologically by sodium or lithium. While the sodium is simply useless, lithium, in the cellular fluid, has a positively injurious effect upon the plant-tissues.

Similar results were obtained in the experiments with summer rye.

It seems, then, to be reasonably well established that the co-operation of potassium in the cellular fluid is requisite for the building of starch in the chlorophyll grains, and hence its necessity to the growth of the plant. In other words, these experiments show that at least one office of potash in the plant is to aid in the formation of starch.

Nobbe proposes, by similar experiments, to investigate the functions of the other elements that make up the food of the plant. We may look forward to very interesting results from studies of this sort.

It should be borne in mind, however, that conclusions like these, founded upon a particular series of experiments, are not to be universally applied. In this case the buckwheat plants did better with potassium as chloride than as sulphate. Had a small amount of chlorine been furnished in another form, the sulphate might have been found more efficient—indeed, practical.

SUGGESTIONS BY THE COMMISSIONER.

THE AGRICULTURAL DEPARTMENT. — *Its purposes and how they are executed.*—It is very manifest that much misapprehension exists throughout the country with regard to the design of this Department and its operations. Its design is to have a general supervision over the agricultural interests of the country; to observe and learn every new principle and practice which has been developed, and any new seed, plant, or fruit which gives promise of usefulness, whether such be the enterprise or the product of our own or any foreign country. It is designed also to collect, tabulate, and publish the statistics of agricultural products, so as to prevent speculative operations; and by the observations and studies of the entomologist, the botanist, the microscopist, and the chemist, to keep pace with the progress of all these branches of knowledge, and thus afford the farmer and planter the most reliable means of guarding against the injurious inroads of insects, of making the wisest selection of plants and seeds, of arresting destructive diseases of vegetation, and of learning the qualities of soil most suitable for their purposes, the composition of fertilizers, and generally the most approved methods of culture.

Congress has annually appropriated a certain sum for the purchase of seeds and plants; the last year, $65,000. This money is expended only for seeds and plants which are of a superior quality, or newly discovered to be useful and valuable; and they are distributed, not for the purpose of supplying *the wants* of individuals, but for the purpose of their introduction throughout the country, because they are either new, useful, or superior; and the mode of distribution is through members of Congress, to whom a large portion of them are sent, because they best know who among their constituents will make the best use of them; to the correspondents of the Department, who are found in every county of the country, for the benefit of the farmers around them; and to such individuals as apply directly for them, leaving the Department to judge who will appropriate them to the proper purpose.

It has been said that much misapprehension exists upon this subject of distribution. In applications made directly to the Department for seed, individuals often furnish a list of twenty or fifty kinds of seed, embracing a whole catalogue, while it should be understood that the Department does not profess to distribute seeds which are common and may be purchased at any seed-store, but such only as are new, improved, and not to be obtained elsewhere. Seeds, when obtained by the Department, are put up in packages, in quantities adapted to the various soils and climates of the United States. No other selection is made at the instance of any individual; so that for applicants to make their own selections of seeds is labor lost. Individuals, too, often send lists of the names of persons living in the same neighborhood to whom they desire seeds to be sent. No attention is ever paid to such requests; otherwise, the power of the Department for good would very soon be exhausted, and the object in view, to introduce into as many parts of the country as practicable what is new and useful, would be entirely defeated. Many letters from one place, and not unfrequently written by one hand, are received at the same time, containing requests for the

same description of seeds. The most that the Department can do in such cases is to send to one or two persons only. It is often the case, too, that applications are made for seeds—garden-seeds particularly—with the remark that seeds sent the previous year turned out very satisfactorily, and that another similar supply is wanted. The answer to such requests must necessarily be, that those who neglect to save seed are not entitled to a further supply. There is another class of requests frequently made to which it is equally impracticable to respond. It is that of individuals who conceive themselves favorably situated to become distributors of seeds and reports, and ask that supplies may be forwarded to them for that purpose. It is sufficient to say, that the Department has ample means of knowing how its distributions can be most appropriately and usefully made, and that a compliance with such requests would only embarrass its operations and tend to defeat its objects.

The Department publishes monthly a report of the statistics and condition of crops, &c., of which there are twenty-five thousand copies printed. These are distributed to about four thousand agricultural and other newspapers, and a large number to members of Congress, agricultural societies, and individuals who apply for them, and to the correspondents of the Department in the different counties.

Congress has heretofore, and until the last session, authorized the publication of two hundred and fifty-five thousand copies of the Annual Report of the Department, which were distributed as follows: One hundred and eighty thousand to members of the House of Representatives, fifty thousand to members of the Senate, and twenty-five thousand to the Department of Agriculture. This would give to each member of the Senate and House about six hundred copies, to be distributed among their constituents; and those given to the Department are distributed to their agents in the different counties; to public libraries at home, and in exchanges with foreign libraries; to agricultural and horticultural societies, and, to some extent, to individuals who apply directly for them. Persons often request that their names be placed upon the list of recipients. No such list is kept, and if it were it would very soon be swelled to an extent beyond the ability of the Department to supply.

When individuals apply for these reports, or, indeed, for seeds, it must be understood that their requests are always responded to in accordance with the rules and principles which have here been stated.

One other remark is proper: The Department is in the daily receipt by mail of small sums of money to pay for seeds, publications, and postage, which is always returned to the sender, inasmuch as the Department has no lawful right to money for any purpose whatever.

AGRICULTURAL EDUCATION.—There is no intelligent man now who hesitates to believe that early education is a great help to success in any sphere of life. Whatever the occupation of a man may be, whether a merchant, buying and selling the products of the world or sailing a ship upon the ocean; a farmer, dealing with the plow, the harrow, and the reaper; the professor of law, medicine, or divinity; each in the practice of his daily calling constantly feels the advantages of early education, and how it lessens the burden of his daily work. It is, therefore, the first dictate of common sense that the plan of education should be graded, not only by the capacity of the student, but in view of the business which he anticipates will occupy his future life.

It is only within a few years that the necessity to educate the farmer did at all attract public attention. It was erroneously almost conceded

that to till the soil was a mere operation of brute force that required no other direction than that which belonged to the physical force of the body. It did not enter into the computation of the necessities of a farmer's knowledge that the earth was a set of mouths and lungs which breathe, and feed, and live, with powers of attraction and repulsion, affected by heat, cold, and moisture; that seeds germinate, root, and grow, and that their growth is a thing of life susceptible of improvement and degeneracy, and that their names, genus, and character are as well defined and classified in the vegetable kingdom as are men and animals who live, breathe, and feed in but another sphere of creation. But now it has attracted the attention of the philosopher and the statesman, the mechanic and the laborer, that inasmuch as to till the soil is the occupation of about one-half of the whole population of the world, the mind that gives a right direction to this immense work must be an educated mind, and that such education should point to the attainment of the kind of knowledge which is best adapted and most profitable for the attainment of success in the end to be realized.

The appreciation of these views is strongly marked by the action of our National Congress in the passage of the act of 1862, which provides the means for the establishment of an agricultural college in every State of the Union. This liberal provision manifestly recognizes the necessity and points to the education of the farmer. Experience has demonstrated that the purely literary institutions of the country are not well adapted to the farmer's wants; that their teaching was the education of youth to a state of certain unfitness for the pursuit of an agricultural life, and imbued him with a store of that kind of knowledge which was ill adapted to his practical occupation. In a very few years of this college training the youthful life of the farmer's son was turned into a path of habit and thought which became very uncongenial to the domestic employments of the farm; and returning home a graduate in science, after an absence of four years, he finds the farm no place for him. He looks around in vain to find some congenial spirit who can appreciate the knowledge that he has gained, some object upon which he can spend a happy thought and hour. His family and friends within the narrow precincts of a farm have ceased to be companionable for him. A contempt for the dull ploddings of a country life causes him to gaze around that he may discover some place of escape from that which is so devoid of interest to him. He is thus driven to the nearest country town, where he may meet spirits more congenial and employment, to him, less irksome; where he may learn to be a merchant's clerk, an indifferent doctor, a dull lawyer, or inefficient preacher, and, perchance, be thrown into the temptations of vice and intemperance, and thus the effort of a fond parent to educate his son results not only in the loss of the hardly-earned means of his education, but the son himself.

Not so the boy whose course of education has never turned his mind from the first impressions which the farm has made upon the earlier days of his life. At an agricultural college he is taught sufficiently in exact science to enable him to hold a respectable position in all the practical walks of life; to know the composition of the earth itself, and of the plants that grow upon it; how they live and move and have their being, and with his own hands habitually dealing with nature, and molding God's creation into forms of higher production, as well as loveliness. This, while it breathes into the body the breath of health, is the delightful work of the world, of which the mind never tires, only because the sources of inquiry and mystery of result are entirely inexhaustible.

The boy whose mind has been thus cultivated to a scientific knowl-

edge of the art which he is so soon to enter upon, and whose hands have been taught practically to apply that knowledge to this important work of the world, returns after graduation to a home where all is congenial around him, and where father, brothers, and sisters delight to listen when he talks of the mathematical and mechanical structure of the plow, and why it is so formed; of the curious science of the composition and growth of plants, and of their marvelous germination and life and death; of insects which prey upon the fruits of the earth, and remedies for their depredations; of chemical changes produced by lime and manure in their application to the soil. He is listened to with a degree of interest which makes him feel that his study has not been in vain, but that he has grown to the stature of a man, who is about to take his place in the march of agricultural progress and afford an example to those around him of the value of agricultural science.

I would not be understood as attempting to detract in the slightest degree from the high estimate in which purely literary institutions of the country are so justly held. No one can for a moment forget or fail to appreciate the mark which their graduates make upon the learned professions, the distinction which they attain as scholars and statesmen, and how essential their teaching is to the honor and dignity of the nation; but the impression which I endeavor to make is, that a different course of study, extending over a different and wider field, and better adapted to the practical operations of life, is of still more importance and better calculated to advance that great interest of mankind in which the farmer is engaged. The agricultural college educates the physical and practical as well as the moral status of the man.

FARM FENCES.—Fencing has become one of the most important considerations demanding the attention of the farmers; and it is wonderful that they should so long submit to the want of proper legislation in their respective States, which would relieve them from this most expensive and unnecessary burden.

An impression, almost as old as our country itself, seems to exist that public roads are public property, and that grass which grows upon them is the common property of all the inhabitants, upon which their cattle may be turned to pasture. This is a great mistake, and one which requires immediate correction, if for no other reason than that it is a very expensive one to farmers. Public roads are, to be sure, public property, but only for special purposes. While the public have the right to pass and re-pass over them, they have no other right than this, which the law gives them, and no more substantial claim to pasture their cattle upon the road than upon the other side of the fence, in their neighbor's field. The law allows the public to use the land occupied by the road to travel over, and whenever they cease, either by operation of law or otherwise, to use it for that purpose, it again becomes the property of the owner of the farm through which it passes. His is the fee-simple right. It is very unjust that either he who owns no land, or, owning it, prefers to use that of his neighbors, should be indulged in so manifest a wrong. It is the duty of the legislatures of all the thickly-settled States to protect the agricultural interests of the country, by providing that cattle shall not run at large, but that every man shall be compelled to take care of and feed his own stock, instead of turning it loose upon the highway to depredate upon the possessions of his neighbor.

Money expended in fencing against these depredations of strange ttle is sometimes disbursed so gradually that the farmer does not tually realize how great is the loss.

In the thickly-settled States, where the farms are divided into ten or fifteen acre fields, the cost of fencing is enormous. Here there is used either wire, board, or post-and-rail fences, and their cost varies in different situations in proportion to the cost of materials, and these differ in quality. I have made an estimate of the cost of fencing in the interior farming-districts of Pennsylvania, with the purpose of showing the comparative cost of different kinds and qualities of fence, as well as to point out how enormous the cost is of making and keeping up either kind; and the calculation is equally applicable to most of the settled States of the Union. And it may be remarked, too, that this expense is annually increasing with the cost and scarcity of material.

The estimate is made of the cost of eighty rods of fence, which, of course, will be modified and altered by the circumstances which surround each particular locality.

Eighty rods, locust posts and chestnut rails, viz:

132 posts, mortised posts, at 70 cents	$92 40
655 chestnut rails, pointed, at 11 cents	72 05
Setting 132 panels, at 15 cents	19 80
Hauling and distributing materials	4 00
	188 25

A like fence made with oak or chestnut posts would cost $59.40 less, the difference being in the expense of the post.

Board fence, the two lower boards being 6 inches wide, and the three upper ones 5 inches wide, and flat on top 4 inches, each post stripped 4 inches wide, viz:

160 locust posts, at 20 cents	$32 00
3,733 feet inch boards, at $22	82 12
Setting 80 panels, at 15 cents	12 00
Nails	4 00
Hauling and distributing	4 00
	134 12

Eighty rods of wire fence, the wire being No. 9, galvanized, 16.5 feet to the pound, viz:

2 large braced locust posts, at $1	$2 00
78 locust posts, at 20 cents	15 60
160 strips, 4 feet long, 1x3 inches	3 00
400 pounds galvanized wire, at 10 cents	40 00
400 wire staples, at 1¼ cents	5 00
Setting posts and putting up wire	8 00
Hauling and distributing	4 00
	77 60

The two strips of pine in each panel serve the purposes of stiffening the fence, preventing cattle from running against it, and, if notched at the corners, will keep the strands of wire in their places.

The farmer who cultivates one hundred acres of land must have at least one thousand rods of fence, according to the present system. This fencing, if of locust posts and chestnut rails, would cost $2,353.12; of oak or chestnut posts, $1,610.62; of locust posts and boards, $1,676.50; of galvanized wire, $970.

If the annual interest of these sums be computed, and then the estimation be made that the average durability of the fence will not exceed sixteen years, it will be found that the heaviest tax paid by the farmer is that of making and keeping up fences.

While fences may not be entirely dispensed with, it will be found

that the character and great cost of the same is occasioned by the necessity for protection against trespassers. Another suggestion may be made, that farmers would gain largely by confining their own cattle to the barn-yard, and cutting grass for them until after harvest, thus dispensing with at least one-half of their inside fences, and avoid the injurious effects of the tramping of cattle upon wet fields.

ENTOMOLOGICAL RECORD.

By Townend Glover, Entomologist.

Further remarks on the Phylloxera.—On page 55 of this issue will be found an article from M. Planchon, who was sent officially to investigate the insects and diseases infesting grape-vines in America, in order to ascertain if the true *Phylloxera vastatrix* was also injuring the vines as in France. As we have given his report, we deem it only just to give also the other side of the question, as much doubt has existed in the minds of some of our vine-culturists as to the theory of the *Phylloxera* being an American insect at all, and as such having been imported into France with American grape-vines.

M. Laliman, in the French journal La Guienne, published at Bordeaux, criticises severely M. Planchon's report to the minister of agriculture upon his late mission to the United States, and questions his conclusions as to the identification of the *Phylloxera*. He says M. Planchon's period of observation in America was too brief for any settlement of the question; and when speaking of the identity of the *Pemphigus vitifoliæ*, (of Fitch,) or the grape-leaf gall-louse, and the *Phylloxera vastatrix*, or grape-vine root gall-louse, he says, "We are a little surprised not to see in the present report any indication on this point." M. Laliman adduces several facts contradicting the idea of the root gall-louse of Europe being an American insect, as "in Missouri, one of the alleged States from which the gall-louse is said to have originated, the grape yield is larger than ever, depressing the market prices in Saint Louis," and quotes Dr. Parker, who says, "We know of no insect ravaging our vines; our sole concern is to sell our grapes, so great is the production of our vines." M. Laliman also argues that if the two insects are identical, as maintained by Messrs. Planchon and Riley, that vines of the Labrusca type, the Isabella and Catawba, would die in America, whereas those gentlemen formerly reported them as the most robust and healthy. The reviewer then cites the points raised by Mr. Berckman, editor of the Farmer and Gardener, that the root gall-louse has been imported into America in large numbers, as M. Labiaux, a prominent vine-grower in North Carolina, imported one hundred thousand vine-plants from the department of Hérault, which has been infested with the European grape-root gall-louse; and many other American nurserymen have also received large numbers of vines from this and other infested European districts. The presence of the *Phylloxera*, or grape-root gall-louse, in America is, therefore, easily accounted for without identifying it with the leaf gall-louse. M. Laliman thinks it scarcely worth while to consider the numerous differences of form and habit characterizing these insects, which have been pointed out by various entomologists, and says that M. Maxime Cornu, in one of the reports given to the Academy of Sciences, declares that, in order to establish the absolute identity of the

two insects, one fact is wanting, and that is, that hitherto no one has yet been able to obtain galls upon the leaves from the *Phylloxera*, or insect which produces the galls on the root, and says that this is indispensable, in his view of the case, in order to incontestably prove the identity of the two insects. M. Laliman further says that Mr. Engelman sent to the Garden of Plants several vine-stalks, coming from Missouri, a State at present infested. One of these vine-stalks was given to him by M. Cornu, on which experiments had been tried during the summer of 1873 with the *Pemphigus*, or leaf gall-louse, and which, in truth, had produced swellings on the roots, and which was verified on taking it out of the pot. "When we planted it in the open soil, at the commencement of November, alas! this vine, martyr to science, imprisoned in a pot of twenty-five centimeters, was superb in vegetation for the situation it was placed in, and the *Pemphigus* had fled."

M. Laliman, after giving other supposed proofs, adds at the end of the paragraph, "consequently the *Pemphigus* is not murderous like the *Phylloxera*, and it is not the same insect, although having some resemblance." He says that, in 1869, M. Planchon told the Society of the Gironde "the insect has always been in Europe," therefore M. Planchon has altered his views since his visit to America. In 1873 Messrs. Bush & Son wrote us from St. Louis, "It is only European vines that are lousy, sometimes the Isabella and Catawba, and we pay little attention to it;" and, lastly, M. Laliman says, "We have sent American vines to a hundred places, and have not had a single report of the introduction of the *Phylloxera* or root gall-louse." There are also several other points of great importance in M. Laliman's article which we might give, but enough has been said to show that some French and American vine-growers differ from the opinion of Messrs. Riley and Planchon as to the identity of the two insects, and the American origin of the great French vine-destroyer, *Phylloxera vastatrix*, or the root gall-louse of the vine.

Some of the American papers have also taken the matter up. In an article in Moore's Rural New Yorker, copied into the Farmer and Gardener, edited by Mr. P. J. Berckman, in Augusta, Ga., Mr. E. J. Labiaux, of North Carolina, states that Dr. Planchon says he "is satisfied that the American *Phylloxera* and theirs are identical." This opinion Mr. Berckman seriously questions, but, admitting it for the sake of argument, he denies that the identity proves that the insect in question was ever exported from this country to France. He then inquires why Dr. Planchon did not visit the locality in Georgia whence, as stated by Dr. Plumeau, of Bordeaux, the insect was exported to France, and asks, "What positive proof has Dr. Planchon acquired during his hasty visit to assert that the insect is of American origin?" and adds that when the report of the special committee, appointed by the American Pomological Society, at its late meeting at Boston, to investigate its origin and injury, will be made next summer, it is more than probable that its existence on this continent will be traced to importation from France, and that instead of American vines having introduced the insect into France, we owe to the introduction of French vines its existence in a few districts in the West. M. Berckman also questions the value of the remedy proposed, namely, the fumes of sulphuret of carbon applied to the roots, and says that, when properly applied, the fumes of this chemical will destroy the insects but will also materially injure the vines. He quotes three experiments made by a competent vineyard-owner in 1869. In the first experiments the application of sulphuret of carbon killed most of the vines operated upon; in the second, a portion of the vineyard was destroyed, even with the application of about one ounce

and a half; in the third, he estimates the cost of applying the sulphuret of carbon in sufficient quantity to destroy the insect to be over ten cents for each vine, which, on a large vineyard, would make it too costly to be profitable.

We merely give these facts in order to stimulate inquiry and experiment on this subject, and to warn vine-culturists not to be too sanguine of new remedies until tested.

In order to test the identity of the root and leaf gall-lice, in the autumn we inclosed some root-infested plants, sent from the vineyards of Mr. George W. Campbell, Delaware, Ohio, (the originator of the Delaware grape,) in pots, in a Wardian or nearly air-tight case, with some healthy leafless vines from our own green-houses. We then cut off some of the infested roots, and put them in juxtaposition with the roots of the healthy vines, in order to find out if the healthy vines will become infested with the root-lice, and *vice versa*. If the now leafless vines next season are attacked by the leaf-louse, we shall consider the proof conclusive; and further, consider the two insects as identical, although in form and habits altered by a residence above ground on the leaf, or under ground on the roots. Mr. Campbell has also promised us a further supply of root-infested vines next spring to continue our experiments.

THE PHYLLOXERA ON FRUIT-TREES.—Mr. Erni, United States consul at Basle, Switzerland, writes to the Department that he learns from a Berlin journal that the *Phylloxera vastatrix* has been found extensively on fruit-trees imported from France; and that the intention of the German and Swiss governments is, in consequence of this discovery, to prohibit the importation into those countries from France of fruit-trees, as they have already done, for some time, of grape-vines.

PARIS GREEN AS AN INSECTICIDE.—The assumption of patent-venders, and those interested with them in the sale of insect-destroying compounds, that they are entitled to the credit of discovering the fact that Paris green is not a healthy diet for insects, and to the emolument of a monopoly of the sale of a well-known poison, is absurd as it is mercenary. The writer made use of this substance in destroying insects several years ago. Experiments have been made upon cotton-insects for several years, and our correspondents have been encouraged to make and report them more carefully than ever the present year; and the unusual prevalence of the caterpillar has caused these trials to become more or less general, and we have reported results from nearly all the cotton counties of the United States, as a matter of course, and do not claim any special credit for the work, and we scout and deride any attempt to make pecuniary or professional capital out of this subject.

HOW TO RECOGNIZE THE COTTON-CATERPILLAR.—As much confusion has hitherto existed, and yet exists, relating to the appearance of the true cotton-caterpillar, *Anomis xylinæ*, and as there is another insect (the grass-worm) infesting the cotton-fields about the same time the real caterpillar makes its appearance, it will be well to repeat a portion of our report on this insect published six years ago, and mention some distinguishing marks by which the cotton-moth may be recognized in either the egg, caterpillar, chrysalis, or perfect state. In the first place, the egg of the cotton-worm is round and very much flattened in form, and of a green color, whereas the egg of the boll-worm moth is round, somewhat bluntish, conical in shape, and of a yellow color.

INSECT AND SQUIRREL DEPREDATIONS.—The following extracts are from the statistical correspondence of the Department:

Baltimore County, Md.—The following insects were to a greater or less extent destructive in our county the past season: The Hessian-fly, on wheat; cut-worms, on corn; more caterpillars than usual on fruit trees; and potatoes were injured by a worm preying on the roots or lower parts of the vines. When this insect came to perfection, it was a small bug of a black color.

Madison, Ill.—From August to October, swarms of moth, which proved to be the *Angoumois* wheat-moth, as described in the annual report for 1856, were seen, especially at sundown, around wheat-stacks and thrashing-machines and in granaries.

RAVENOUS SQUIRRELS.

Contra Costa, Cal.—On ground not overrun by squirrels wheat averaged 20 bushels per acre. The loss by the depredations of squirrels and gophers will average one-fourth of the crop.

CHEMICAL MEMORANDA.

By Wm. McMurtrie, Chemist.

Soil analysis.—Great difficulty has generally been experienced by analysts in fixing upon a method by which the absolute fertility of a soil may be determined, or at least one which will afford results indicating a degree of fertility that will correspond with the experiences of actual practice, and founded upon the amount of the crops produced from it. Many soils containing a considerable quantity of organic matter in the form of *humus* have the mineral elements of plant-food locked up in organic combinations, which are insoluble in water, and, therefore, unless these combinations be acted upon by other materials having a stronger solvent power, and which may at the same time be readily taken up by the plants, they must lie dormant in the soil. In the decomposition of the nitrogenous matters of the soil, carbonic acid and ammonia are formed. Alkaline carbonates are known to have a solvent action upon the *humus* of the soil, and these substances are the materials which do the most work in supplying plants with nutritive principles. It is therefore evident that when we make use of the stronger acids in our analyses, we go further than the forces brought to bear in nature will warrant. Mons. L. Grandeau has thoroughly developed this idea in his investigations upon the black soils of Russia, and has found that in all cases the sample of soil to be analyzed should be exhausted with a dilute solution of carbonate of ammonia, since, he says, this latter re-agent plays the part, first, of an acid, and then of a base, and that the intervention of a strong acid, such as chlorhydric, is unnecessary. This Department has lately had an opportunity of making a practical application of M. Grandeau's ideas and of his method of soil analysis. During the past year we received, through Lieut. Col. S. C. Lyford, of the Ordnance Office of the War Department, a sample of black soil from the plantation of Mr. P. Kemble Paulding, on Brae's Island, Beaufort County, South Carolina. The sample in question had every appearance of being decidedly fertile, but as far as the cotton-crop is concerned, experience has proved that quite the opposite is the case, as may be seen from Colonel Lyford's communication. He says:

> It having been found impracticable to raise cotton from this soil, Mr. Paulding desires to know what constituents are present which prevent the cultivation of such a crop. As a great deal of such soil is found on the various islands of the South Atlantic coast, a complete analysis will be of great interest to the planters of that section.

In compliance with the suggestion of Colonel Lyford, a qualitative examination of the soil was made, revealing the presence of protosulphate of iron; and this fact may be considered sufficient cause of failure in the production of cotton. A complete quantitative analysis has, however,

been prosecuted according to Grandeau's method, and the following statements indicate the results obtained.

Preliminary analysis of soil gave:

Moisture	4.75
Organic matter	14.24
Inorganic matter	81.01
	100.00

Specific gravity of soil, 1.14.

The aqueous extract of the soil has an acid re-action.

The soil itself is of very fine texture, free from stones, is very compact, and becomes very hard when dried. When treated with a dilute solution of carbonate of ammonia, it yielded an extract which, when evaporated to dryness and strongly heated, left a residue which contained, in 100 parts, the following constituents:

Organic matter	86.950
Silica	1.878
Sulphuric acid	3.421
Magnesia	1.956
Lime	1.434
Peroxide of iron	0.913
Phosphoric acid	0.619
Potash	2.909
	100.080

One hundred parts of the mineral matter remaining in the soil, after exhausting with carbonate of ammonia, contain:

Insoluble silica, sand, etc	78.100
Soluble silica	0.205
Lime	0.380
Magnesia	0.200
Manganese	0.491
Alumina	16.843
Peroxide of iron	2.970
Phosphoric acid	0.190
Sulphuric acid	0.677
	100.056

Collecting the above results, we find that 100 parts of air-dried soil contain:

Moisture			4.750
Matter soluble in carbonate of ammonia.	Silica	0.0432	
	Sulphuric acid	0.0786	
	Magnesia	0.0450	
	Lime	0.0330	
	Phosphoric acid	0.0142	
	Peroxide of iron	0.0210	
	Potash	0.0669	
	Organic matter	2.0000	
			2.3019
Matter insoluble in carbonate of ammonia.	Insoluble silica, sand, etc	62.93	
	Soluble silica	0.165	
	Lime	0.307	
	Magnesia	0.161	
	Peroxide of manganese	0.395	
	Peroxide of iron	2.390	
	Alumina	13.594	
	Phosphoric acid	0.153	
	Sulphuric acid	0.546	
	Organic matter	12.240	
			92.781
			100.8315

As we have seen above, the specific gravity of the soil is 1.14. A cubic foot of it therefore weighs 71.42 pounds, and a stratum of soil, one foot in depth, extending over one acre, will contain 3,100,055 pounds. This amount of soil is capable of yielding materials immediately available for plant food as follows:

	Pounds.
Silica	1,331
Peroxide of iron	651
Phosphoric acid	440
Potash	2,077
Magnesia	1,395
Lime	1,023
Organic matter	62,001

It will therefore be seen that the soil in question contains sufficient material to satisfy the immediate demands of a cotton crop, although the quantity may be somewhat limited. The main trouble is undoubtedly due to the fact of the existence of proto-sulphate of iron in the subsoil, and probably free sulphuric acid also. Both of these substances have a poisonous influence upon plants. The planters of the South Atlantic coast, who have this difficulty to contend with, must necessarily adopt some means to remove this salt of iron, and to neutralize the free sulphuric acid. The most economical method by which this may be accomplished is a copious application of lime. In case of the soil in question, about 150 bushels of lime per acre will probably be required. I would also advise thorough under-draining where this is deficient, and it is probable that this is the case wherever the difficulty in question exists.

EXHALATION OF MOISTURE BY PLANTS.—That plants emit moisture during their growth is generally admitted, but what are the circumstances which are the most favorable to this action has never been fully determined until lately, when Mons. A. Barthelemy took up the subject. Many observations have been made it is true, but it is probable that the results obtained by the observer named above will be found more satisfactory than any heretofore published. In some of his observations Mons. Barthelemy followed the method of Mariotte, which consists in causing the branch to be experimented upon to penetrate a flask or other closed vessel and weigh the condensed water. He took the precaution, however, to introduce into the vessel a thermometer. When the plants were enclosed in this manner and exposed to direct sunlight, the temperature rose to 50° C., and small drops of moisture condensed upon the cold parts of the receiver. When removed to the shade the temperature rose slightly and the condensation almost entirely ceased.

For certain reasons, however, he was inclined in further researches to give preference to the method of M. Gareau, which consists in absorbing the moisture in chemical substances, in order to determine the comparative quantities evaporated from each side of the leaf. The leafy portion of the plant, with a weighed quantity of chloride of calcium is placed under a carefully luted receiver, and in order that the plant may have the same conditions as in the atmosphere, there was also inclosed in the receiver a small quantity of bicarbonate of soda, which by dissociation supplied the requisite quantity of carbonic acid.

The complete results of his experiments are too lengthy to be given in extenso, and we shall give only his conclusions, referring those of our readers who may desire more complete data with regard to this subject to M. Barthelemy's report in Comptes Rendus of November 10, 1873.

He concludes that aqueous exhalations from plants may be effected in three ways:

1. By insensible exhalation from the entire surface of the cuticle by means of a true gaseous dialysis.

2. By sudden emission of saturated gases which escape from the stomata when the plant is submitted to a rapid elevation of temperature, especially when inclosed.

3. By accidental exudation, resulting from a defect in the equilibrium between the absorptive action of the roots and the work of the parts exposed to the atmosphere, in fixing carbon combined with the elements of water, work which ceases with the disappearance of light.

I know that it is also right to conclude that heat exercises a strong influence upon this function, and that at equal temperatures carbonic acid in presence of light has the effect of diminishing the evaporation.

AMMONIA AND NITRIC ACID—THEIR RELATIVE VALUE IN AGRICULTURE.—Dr. Hellriegel of Dahme, having had his attention particularly, directly directed to the comparative influences of ammonia and nitric acid upon plant growth, was led to make an extended course of investigations continuing through a series of years, the results of which formed the subject of an interesting paper which he presented at a late meeting of the Central Agricultural Society in Frankfort. His work consisted principally in sand and water culture experiments with different compounds of ammonia and nitric acid which may be practically applied in agriculture, and he has certainly obtained some very interesting and valuable results; effects of the application of the different compounds may be shown by the following table:

Kind of seed grown.	Nitrogenous compound applied.	Amount of dry substance harvested.
		Milligrams.
Barley	Nitrate of lime	12, 800
Do	Sal ammoniac	300
Do	None	300
Summer-wheat	Nitrate of lime	22, 000
Do	Sal ammoniac	380
Do	None	630
Summer-rye	Nitrate of lime	15, 000
Do	Nitrate of ammonia	720
Do	None	810

In case of the barley, when the nitrogen was applied to the plants in the form of nitric acid they grew normally and well, but as may be seen from the table when sal ammoniac was applied no more was produced than when no nitrogenous material was added. The same remarks apply to summer-wheat and summer-rye, except that in these cases the production was less when ammonia-salts were applied than when the plants received no nitrogen whatever, showing that the ammonia-salts seem really to have an injurious effect. It would, therefore, appear that in their decomposition the roots suffered from the deleterious influences of the separation-products. In the decomposition of nitrate of lime, however, nothing but carbonate of lime, which is perfectly harmless, is left behind. Since it is evident, therefore, that ammonia-salts failed to produce good results in sand-culture, it was considered of some importance to make some experiments to determine if it were not possible to devise some means by which these could be employed and be not entirely lost. In order to avoid the injurious separation-products in question, Dr. Hellriegel tried the effect of nitrate of ammonia, and as this combination contained two sources of nitrogen, both nitric acid and ammonia, he took advantage of it to endeavor to determine the relative value of these two constituents, since, when comparing this combination with nitrate of lime, the former contains two equivalents of nitrogen, while

the latter contains but one. Application of two equivalents of the latter should therefore produce an effect equal to that of one equivalent of the former. If this be confirmed by experiment, then must nitric acid be as assimilable as ammonia, and *vice versa*. The experiments with this regard resulted as follows:

In 1870, barley which had been fertilized with 12 equivalents of nitrate of lime, gave, in two experiments, respectively, 14,910 and 15,854 milligrams of dry substance. Application of 6 equivalents of nitrate of ammonia also gave in each of two experiments, respectively, 14,910 milligrams of dry substance. In other years, little more than one-half the amount of dry substance was collected when one equivalent of nitrate of ammonia was applied as when two equivalents of nitrate of lime were employed.

Experimenting with regard to the neutralization of the injurious acids liberated by the processes of vegetation in case of the application of sulphate of ammonia and sal-ammoniac, he made use of a simultaneous application of carbonate of lime, and found that by this means healthy growth could be produced. The following table indicates his results:

Kind of seed sown.	Compounds applied.	Am't of dry substance harvested.
		Milligrams.
Summer-wheat	Twenty equivalents of nitrate of lime	30, 552
Do	Twenty equivalents of sulphate of ammonia	406
Do	Twenty equivalents of sulphate of ammonia and carbonate of lime	22, 674
Do	Twenty equivalents of sal-ammoniac	171
Do	Twenty equivalents of sal-ammoniac and carbonate of lime	25, 647
Barley	Sixteen equivalents of nitrate of lime	19, 525
Do	Sixteen equivalents of sulphate of ammonia	953
Do	Sixteen equivalents of sulphate of ammonia and carbonate of lime	16, 081

These results have a practical bearing in that they show that while ammonia salts of any kind may be employed upon soils containing carbonate of lime, their application must be avoided in case of clay soils containing little or none of this constituent.

BOTANICAL NOTES.

By Geo. Vasey, Botanist.

Apocynum cannabinum as a fiber plant.—We have received from Rev. George Ainslie, Idaho, some roots and stalks of a plant which grows wild in that Territory, and which furnishes an abundant and strong fiber, used by the Indians in manufacturing cord, cloth, &c. Mr. Ainslie says that the Indians believe that for bow-strings, fish-lines, &c., it is stronger than any fiber furnished by civilization. They call it *kam*. The specimens sent appear to be *Apocynum cannabinum*, a plant closely related to the milk-weed family, which also furnishes some valuable fibers. This plant occurs more or less extensively in all parts of the country, and particularly in the West. It has long been known to possess a strong fiber, and has, on that account, been called Indian hemp.

Some months ago the Gardener's Chronicle (London) gave an account of a species of Apocynum (*A. Venetum*) which had been discovered in Turkestan, growing wild in great abundance, and whose fiber is said to be "as tender and delicate as flax, as strong and tenacious as hemp, and, by combining the qualities of the two, greatly superior to either."

It was expected that this plant would be transplanted to Europe and other countries. It is very probable that our own apocynum may possess all the qualities of the one above mentioned. Many of our native plants furnish strong fibers, but their relative value and commercial importance can only be determined by experiments on a suitable scale, and these experiments can nowhere be more satisfactorily instituted than in those places where the plants have a natural foothold.

NOURISHMENT OF BUDS THROUGH THE BARK.—In Comptes Rendus for November is an article of much interest, by M. E. Favres, detailing the results of some experiments made by him to determine the direct source of supply of food to the buds of trees.

The trees selected for the experiments were the mulberry, walnut, and cherry laurel. Three kinds of experiments were instituted: 1st. The removal of a complete or partial ring of bark. 2d. Separating flaps or strips of bark bearing buds. 3d. A combination of the two preceding methods.

On the walnut and laurel complete ringing of a branch was followed by early death of the buds above it, but a narrow bridge left sufficed to secure continued growth. The exposed wood was in all cases protected from the air. If the ringing is performed around the bud instead of around the branch, the same results followed. In all these cases starch is found in the buds below the ringing, but above it is soon exhausted by the growth of the bud, and when the supply of starch is exhausted the death of the bud follows.

There is no difficulty, M. Favres observes, in proving the ascent of nourishment by the bark, if a strip bearing a bud be detached, except its lower end, from a mulberry during the season of active vegetation.

A strip of bark with a bud separated the 20th of June made a branch 20 inches long by the end of August. The walnut gave the same results, with abundant cellular exudation on the internal face of the strip, which must be kept from drying, but which did not show quite as great growth as normal branches. A strip of wood may or may not be left on the detached bark. If a branch be ringed at short intervals the buds in the intervals will die in a time proportionate to their distance from the lower ring, and the starch will be found wanting in such intervals, conclusively proving the passage of starchy matter to the bud by means of the bark.

DE CANDOLLE'S PRODROMUS.—The seventeenth volume of this great work has been published, and the work is here concluded, although only the plants of the Exogenous or Monocotyledonous class have been described. The work was commenced in 1818, by Augustin P. De Candolle, who conducted it until the publication of the seventh volume, about 1841, when, his death occurring, the work was continued by his son, Alphonso De Candolle, assisted by his son, Casimir De Candolle, the concluding volumes having been published solely by Casimir, since the death of his father Alphonso.

There are described in the work 5,134 genera and 58,975 species, although this is probably not more than one-half the number of species of Dicotyledonous plants existing.

The principal natural orders described are:

	Genera.	Species.		Genera.	Species.
Compositæ	911	8,561	Acanthaceæ	154	1,481
Leguminosæ	283	3,853	Asclepiadaceæ	134	1,013
Rubiaceæ	225	1,888	Labiatæ	122	2,401
Euphorbiaceæ	191	3,272	Cruciferæ	100	988
Scrophulariaceæ	176	1,879	Solanaceæ	65	1,725
Umbelliferæ	160	1,016			

The most numerous genera are as follows:

	Species.		Species.
Solanum	915	Phyllanthus	447
Euphorbia	751	Erica	429
Senecio	601	Salvia	410
Croton	461	Peperomia	389

POPULUS MONILIFERA AS A SHADE TREE.—M. Van Hulle, curator of the Royal Botanic Gardens at Ghent, writes as follows:

Many kinds of trees, chosen for planting avenues, public promenades, &c., either do not accommodate themselves to all kinds of soils, or else require an inconvenient length of time to attain to such size and development of foliage as will afford the desired shade. In consequence of this, the Canada poplar (*Populus Canadensis*) has been largely planted about Munich and other places in Germany. This tree grows quickly, and in almost any kind of soil. Its only defect, as a shading tree, is that it sometimes, if left to itself, shoots up into too spiral a form to be of service in that way. This, however, is easily guarded against by heading down the young trees to the height of from 12 to 15 feet, and paying some attention to the pruning of the branches for some time, so as to secure the formation of handsome crowns. Treated in this way, the trees are quite as effective at some distance as well-grown specimens of horse-chestnuts.—*The Garden.*

The *Populus Canadensis* mentioned above probably means our cottonwood, (*Populus monilifera* Ait., of which *P. Canadensis* is a synonym.) We would suppose the *Populus balsamifera* to be at least equally valuable for the purpose of shade.

EARLY FLOWERING OF THE JASMINE.—In consequence of the mildness of the winter thus far, *Jasminium nudiflorum*, a Japan species of jessamine in cultivation here in the open air, has been in flower since near the 1st of January, two or three weeks, at least earlier than usual.

MICROSCOPIC INVESTIGATIONS.

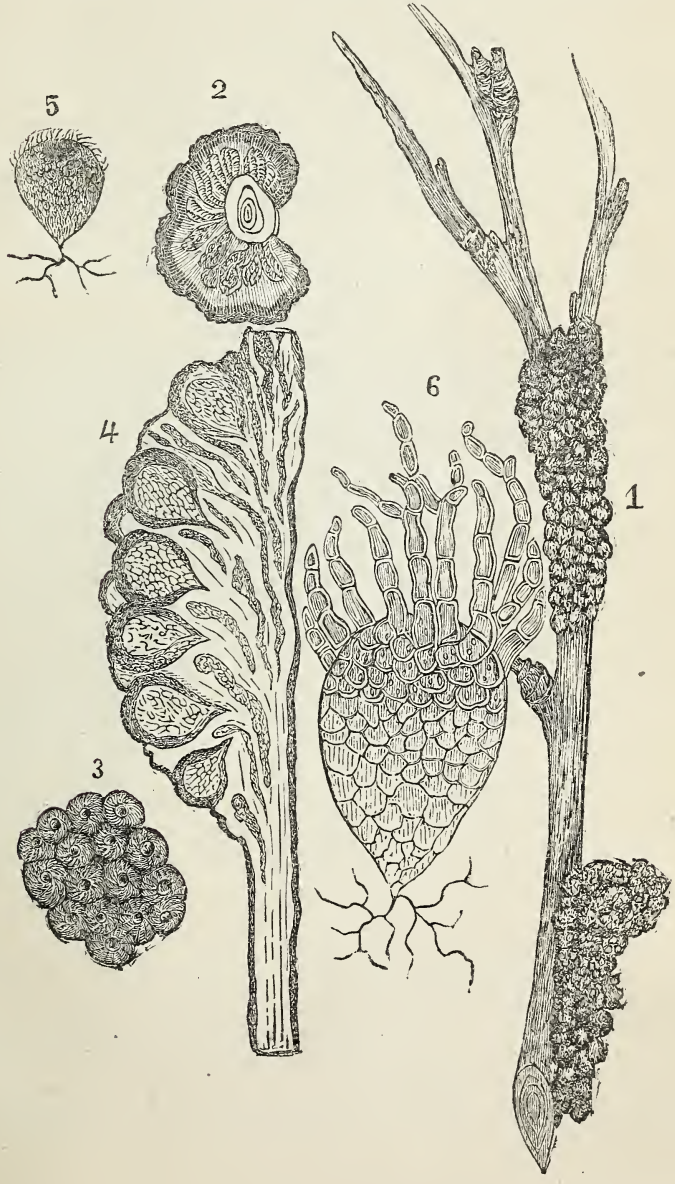
BY THOMAS TAYLOR, MICROSCOPIST.

BLACK-KNOT.—Entomologists and botanists are now pretty generally agreed that the black-knot of cherry and plum-trees is produced by a fungus, but they have failed thus far to define its internal structure. Schweinitz, the American botanist, who died in 1834, seems to have been the first who suggested that it might be of fungoid origin, and he named it *Sphæria morbosa*. During the present year several correspondents engaged in fruit-growing have sent to the Department specimens of cherry and plum tree black-knot, asking for information in relation to its cause and cure.

Hon. Marshall P. Wilder, of Boston, forwarded some specimens of the black-knot on cherry-tree branches, which I used as the basis of my experiments. The usual methods of investigating the black-knot by placing opaque sections of it under the microscope, gave results so unsatisfactory that I determined to employ my usual methods of rendering organic bodies transparent and yielding, by means of acids and alkalies. In this way the higher powers of the microscope may be brought to bear effectively on the fungus, its mycelium and spores, if present. The immediate use of strong mineral acids and caustic alkalies on suspected fungoid bodies has this advantage, that these prevent the possibility of the production of fungus growths by fermentation during the investigation. Portions of the black-knot were subjected to strong nitric acid during several days, and then examined under low and high powers of the microscope. Portions were also well washed in pure water, to free them from acid, and then submitted to the action of caustic potash. For the purpose of distinguishing colorless spores, mycelium, starch, chlorophyl, and cellulose from one another, a solution of iodine, con-

taining a small portion of nitric acid, was applied to the specimens. This solution colors starch blue, fungoid transparent matter a light amber, infusorial forms a dark amber, while cellulose and chlorophyl remain colorless under certain conditions. When viewed under a power of 100 to 600 diameters these substances are clearly distinguished from one another. I also submitted the dry leaves of the twigs to the same processes and examined their translucent cellular forms carefully, and observed some indications of fungus spores within the cells of the leaves.

1. Fig. 1 represents the general appearance of the black-knot of the cherry; 2, a cross section; 3, an enlarged view of it, showing indenta-



tions in the center of the conceptacles or *Perithecia* of the fungus; 4, a longitudinal section of the black-knot and branch of a cherry tree, in which sections of the *Perithecia* are exhibited highly magnified, while the woody fiber is represented of the natural size, as seen by the naked eye; in its advanced stages its woody structure appears as if it had been broken up into shreds or burst asunder, and its interstices filled with a very porous bark-like substance, which is again interspersed with a very fine transparent thread-like mycelium; I have no evidence, however, that this mycelium has any direct relation to the black-knot fungus; 5, a typical representation of the *Perithecia;* 6, a very highly magnified transparent view of a *Perithecium.* The structure is cellular as exhibited, and of a dark amber color. Each top surface-cell of the *Perithecia* generally contains two or more very minute spore-like bodies; frequently the bottom cell of the mycelium contains these spores also. Perfected fruit will doubtless yet be found on the mycelium, which is jointed and branched, and resembles very much in structure the fruited black-orange mycelium, described in my last report, except in color. I have found floating in the gum solution, when examining the mycelium of the black-knot, several *Perithecia* without stalks having the same color as the mycelium; but further observations are necessary to demonstrate their relationship. Further investigations will have to be made before any suggestions can be published in relation to the prevention of black-knot as a result of the work already prosecuted.

Onion-rust.—In a recent experiment, made for the purpose of destroying fungus on the onion, the following mode has proved very successful: Some specimens were obtained in the market, covered with amber-colored fungus. I secured one of them in an inverted glass receiver, which I placed over a beaker filled with nitrous acid. The fumes arising from the acid, without the application of heat, enveloped the onion, and soon dissolved and destroyed the fungus covering its surface. In order to ascertain whether the life of the plant had been destroyed, I placed it in a bulb-glass filled with water. It sprouted in a few days, and is now in healthy growth on my desk. It has numerous leaves, which have attained a length of 6 to 12 inches; thus showing conclusively that, in some cases, fungoid growths may be effectually destroyed without injury to the plants on which they grow.

This principle admits of many important applications. In some diseases of the potato the surface alone appears to be affected, and the same is true in regard to certain diseases affecting the tubers, roots, fruits, and grains of various other plants, any of which may be readily exposed in large quantities to the fumes of nitrous acid. As nitrous acid has the power of depriving organic bodies of their oxygen, its destructive action on fungus is probably due to this property. The extent to which this treatment may be safely applied to the smaller grains will be the subject of future experiment.

THE PHYLLOXERA IN AMERICA.

It is known that M. Planchon, a distinguished scientist, was delegated by the Agricultural Society of Hérault, in France, to visit the United States during the last summer for the purpose of investigating the character and habits of the insect which has for several years past been so terribly destructive to the vineyards of Europe, and the ravages of

which, although to a much less extent, have also been experienced in this country. M. Planchon, upon his return to France, has promptly made known the results of his mission. An early copy of his report enables us to state these results for the information of vine-cultivators in this country. It will be seen from what follows that M. Planchon's observations have led him to conclude that the insects which have devastated the European grape-vines, and which have been more or less injurious to the vines in this country, are identical; that in consequence of the disease occasioned by this insect the culture of European grape-vines in this country has in all cases proved a failure; that certain American vines are found to resist, to a great extent, the attacks of this destructive enemy, while there is one, the Scuppernong, of North Carolina, that absolutely and entirely escapes its ravages; and, what is most important, that another insect has been discovered here, which proves to be a natural and active enemy of the great destroyer, and which it is believed may be effectually employed in impeding if not in finally arresting its ruinous march. M. Planchon's report, of which the following is a translation, is dated at Montpelier, France, the 10th of November, 1873, and is addressed to the minister of agriculture of France:

REPORT OF M. PLANCHON ON THE PHYLLOXERA OF EUROPE AND AMERICA.

Mr. MINISTER: In accordance with the proposition of the Agricultural Society of Hérault you have commissioned me to proceed to the United States to study the history and habits of the insect which has for years ravaged the grape-vines of Provence, Languedoc, and Bordelais. The points indicated to me for investigation were as follows:

1. Is the *Phylloxera vastatrix* of Europe the same as the insect described in the United States under the name of *Pemphigus vitifoliae?*

2. Does the European vine yield to the fatality in America?

3. Do certain varieties of American grape-vines resist the destructive action of this insect while others absolutely escape its attacks? Consequently, can the different varieties of European vines be successfully engrafted upon such vine-stocks as may be found to resist the Phylloxera?

4. Does there exist in the United States an insect which is destructive of the Phylloxera, and that even seeks it beneath the ground? And, if so, could these *cannibals* of the Phylloxera be introduced into Europe, so as to keep the ravages of their enemy within certain limits?

To these principal objects were added, as accessories, those of the study of the habits of the Phylloxera in America; of indigenous vines and the principal varieties of vines in that country; and finally, the study of American vines with a view of ascertaining their specific characters and the mode of culture.

I left Havre on the 4th of August, 1873, and was enabled to devote to these researches the interval of time between the 29th of August and the 4th of October, to visit the principal vine-growing districts of the United States, with the exception of California, where the Phylloxera is yet unknown, and, thanks to the generous aid which I received in all quarters, I was enabled to collect the materials for a complete and satisfactory report upon the objects of my mission.

I have now the honor to submit to you, in an abridged form, the conclusions to which my researches have led me; conclusions which are confirmed by the opinions of Mr. Riley, in America, and of Messrs. Laliman and Lichtenstein, in Europe:

First. As to the identity of the European and American insect. There is no doubt on this point. I have examined the insect in all its forms and under all its conditions, upon American vines, both wild and cultivated, and have found it absolutely the same as that of Europe. Its existence in America for a long period has been proved by the *Phylloxera* galls which were collected in Texas as long ago as 1834, by the botanist Berlandier, upon the vines of the *Vitis monticola*.

Secondly. The decline, in some cases nearly fatal, of European vines transported to America is a fact long known but not generally understood. I have found new proofs of it. Some have attributed the decline to a change of climate, since the culture of European vines has been universally unsuccessful throughout the whole country, from

Canada to Florida, and from the East to the Rocky Mountains, Mr. Riley has discovered the true cause to be the *Phylloxera*.

Thirdly. The resistance of certain American vines to the attacks of the *Phylloxera* has been noted by Mr. Laliman in Europe, and by Mr. Riley in America. Shall we confide implicitly in the statements of these gentlemen, or shall we inquire into some apparent contradictions in their assertions? Upon these points I make, from my note-book, the following extract:

A particular species of vine, special to the Southern States, and not generally known in the Northern States, where the climate will not admit of its culture, the Scuppernong, (*Vitis rotundifolia,*) absolutely escapes the *Phylloxera;* and, in all my researches, I have never found it upon either roots or leaves. It is the only vine that possesses this characteristic, and it will, therefore, be the vine-stock to choose as a graft-bearer of European vines, if certain difficulties can be conquered, that the nature of the wood seems to oppose to its multiplication by cuttings and its aptitude to receive the graftings of other vines.

I shall refer again to this entirely new subject, that I have studied with care in North Carolina, where the Scuppernong exists in a wild as well as cultivated state.

Although the *Phylloxera* attacks the roots and sometimes the leaves of the resisting vines, I will point out those stocks that ought to make excellent graft-bearers of our vines. They are the Concord, (*Vitis labrusca,*) the Clinton, (*Vitis cordifolia,*) the Herbemont, the Norton's Virginia, and the Cunningham (*Vitis æstivalis.*) My detailed observations would permit me to add other names to this list; but I have purposely limited myself to the indication of those stocks the resistance of which has been proved, and the introduction of which can be recommended to the vine-cultivators of Europe, as proof against the *Phylloxera*.

Upon the question of the attempt to graft European plants upon the resisting vine-stocks of America, allow me to await the approaching deliberations of the Central Agricultural Society of Hérault, and then to transmit to you for publication the conclusions which may be reached concerning the stocks to introduce; the practical means of procuring them in good condition; the modes of grafting by which we may most promptly discover whether the grafting of our vines upon them will give the desired results, or whether it is necessary, in case of failure, to cultivate seedlings of the best American vines. This last resource of direct culture depends upon the localities where the constant presence of the *Phylloxera* and the impossibility of submersions will oppose themselves to the culture of European vines.

Fourthly. The existence in America of an enemy to the subterranean *Phylloxera* is happily no longer an hypothesis. The active and intelligent researches of Mr. Riley have enabled him lately to discover an *acarus*, which justly fills the *rôle* of *cannibal* to the *Phylloxera*. This *acarus*, the history of which has not yet been published, but of which Mr. Riley and myself will shortly give an account in detail, is actually living in my possession, having been captured more than a month ago. It is a kind of *Tyroglyphus*, which we have named the *Tyroglyphus phylloxera*. It is of the same genus as the mite, or flesh-worm of cheese-rind, and like other *Tyroglyphs*, produces an *acarus* of a different appearence, described under the name of *Hypopus*. My efforts this winter have been to multiply it in a close box, and in the approaching spring, I shall endeavor to acclimate it in the soil.

Although naturalists perfectly understand the importance of the *rôle* that these parasites or cannibals play, in checking the increase of certain destructive insects, it is not well to exaggerate the importance of the *acarus* that devours the *Phylloxera*. Upon this point, as well as that of grafting upon resisting stocks, experience alone will permit positive affirmations.

The results of my mission may be stated in general terms to be:

1st. The discovery of the absolute identity of the *Phylloxera vastatrix* of Europe, and the *Pemphigus vitifoliæ* of America; the proofs that the European vines have always failed in the United States, California excepted; the confirmation of the existence of vines which resist the attacks of the *Phylloxera*; the discovery that the Scuppernong, (*Vitis rotundifolia*) is not even attacked by this insect, and the introduction of an *acarus* that can check the multiplication of this enemy of our vines.

2d. The consequences of the preceding facts are: the probability of being able to save our vine-stocks from destruction by grafting them upon the American resisting vines that have been named; and the possibility of cultivating directly these resisting vines and obtaining good stocks, the Norton's Virginia, and the Herbemont, for example.

I propose to treat the subject of the culture of American vines, and the nature and fabrication of their wines, *in extenso*, in a subsequent report. I also intend to introduce into the report, a study of the species and varieties of American vines.

M. Planchon is undoubtedly in error in attributing the failure in the out-door culture of the European grape (or, more properly, the Asiatic grape) in this country solely to the ravages of the *Phylloxera*. The true cause of this failure is well known to be that of fungoid growth

upon the foliage. It is purely a climatic influence, as totally independent of any insect as was the destruction of European vineyards in 1845 by the Oidium.

In the summary of his observations, M. Planchon refers to the measurable absence of the *Phylloxera* in California. It is remarkable that he did not note the evidence in the case, as the European grape is almost exclusively cultivated there; and consequently it might be expected that the *Phylloxera* would be more plentiful there than here, where the foreign grape is not generally cultivated. In this particular M. Planchon has evidently been misled by Mr. Riley, whom he quotes as his authority for the statement relative to the cause of failure with the foreign grape.

It may also be questioned whether the selection of our native varieties of grapes that are comparatively free of the disease, as made by M. Planchon, agrees with the numerous observations of American grape cultivators. Certainly, all recorded observations go to prove that the smooth-leaved species and varieties of our grapes are more generally attacked than are those with pubescent foliage. The Clinton, a variety of *Vitis riparia*, is particularly subject to attack, yet M. Planchon includes this variety in the list which he recommends for importation into France, as resisting the attacks of the *Phylloxera*. As a strong growing stock to graft upon, it is undoubtedly meritorious, much more so, indeed, than some other varieties in his list.

W. Saund

FACTS FROM OFFICIAL SOURCES.

JUTE.—*North Carolina.*—A planter, writing from North Carolina, says that he planted the jute-seed, furnished by the Department, May 1. The ground was prepared as for cotton, and the seed dropped 12 inches apart; land, moist bottom, and, as the spring was a very wet one, the seed lay dormant for three weeks; consequently, a good stand was not had. The plant grew to a height of 13 feet, with limbs from 5 to 7 feet long. The plat was plowed twice, and hoed once. It was cut October 1 and thrown into water, where it remained to rot three weeks; the bark was then easily stripped from bottom to top. A specimen of the fiber was exhibited at the State fair, and pronounced very fine by persons who were familiar with its culture, having seen the plant and fiber in their native habitat. Our correspondent is of the opinion that the bottom lands of North Carolina could be made to produce, by liberal manuring, as much as 3,000 pounds of fiber per acre. It was troubled by no insects; besides, he had a cotton patch by the side of the jute, and no caterpillars made their appearance to disturb the cotton; while in other fields they destroyed several acres in a week.

Georgia.—A planter in Georgia, who has succeeded well in an experiment in raising jute, says that if 5 cents per pound can be netted, more can be made by raising jute than cotton. He planted about the 1st of May; the seed germinated freely, and the plants grew finely on rather poor land, attaining a height of over 10 feet by the 19th of September.

Louisiana.—Mr. Le Franc, President of the Jute and Ramie Company of New Orleans, has sent to the Department, for its museum, five specimens of jute and its fabrics raised and manufactured in Louisiana. These consist of jute filament, rolled, after cleaning by machinery; jute rope, crude or unrotted, as it comes from the machine; and jute rope

made of rotted jute. Mr. L. says the jute is acknowledged to be 50 per cent. superior to the India article. Inspection of these very fine specimens, by those interested in this new American industry, is invited.

Bengal.—The increased demand for jute in Calcutta, whence almost all that is manufactured is imported, has stimulated the culture of the plant in India in a high degree. In Bengal, where twenty years ago jute was only cultivated for individual use, the plant now forms a staple product of the country. Next to rice, it is the principal product; and, as compared with rice, it is found to be the safer and more certain and profitable crop. In several divisions of Bengal the culture has been extended enormously within three or four years, and yet the demand for exportation is by no means met. Both high and low lands are found to be adapted to its growth, and it is easy and sure of cultivation; and so remunerative that the condition of the *ryots*, or cultivators, is seen already to have been much improved by it. Hitherto India has not merely raised the best jute, but it has been almost the only country where it was grown at all. The culture in the United States is only just beginning; but, as will be seen from the opinion quoted above, in regard to Louisiana, we have already succeeded in producing a fiber which competent judges pronounce to be superior to that of India.

International Horticultural Exhibition and Botanical Congress in Italy.—The Department of Agriculture has received through the State Department an official communication from Count Zannini, the chargé d'affaires of Italy here, giving information that an International Horticultural Exposition and a Botanical Congress will be held coincidently at Florence in May next, under the patronage of the Royal Tuscan Horticultural Society; and that the project is commended by the government of the King of Italy to that of the United States, to the end that commissioners may be appointed to take part therein. It has not been deemed advisable to request legislation upon the subject; but Count Zannini has been informed that such information will be given through this Department as will enable horticultural and other bodies in this country, if so disposed, to take part in the exhibition and congress. The former will embrace exhibitions of fruits, plants, flowers, &c., for the best collections of which gold and silver medals will be given, respectively, by the King of Italy, the minister of agriculture, and an association of lady patronesses in Florence. The botanical congress will be occupied with memoirs, essays, and discussions of appropriate topics. Both the exhibition and congress will remain open from the 11th to the 25th of May.

Guinea grass.—Mr. C. Codrington, of Florida, formerly of Jamaica, communicates to the Department a paper touching the cultivation and natural growth of Guinea grass in the West Indies, and its introduction into Florida. Speaking of the island of Jamaica, he says he has never known the working mules there to get grain of any kind, and if offered them they would not eat it, yet they are as hard-worked as any stock in the world; Guinea grass being the only feed supplied. Of course, therefore, in those islands this grass is not considered a noxious weed, as it is too often regarded by Southern planters. The people are only too glad to have it, and, where it thrives, abandon every other cultivation to make way for it. Once established, very little cultivation is required. Hired laborers go through the fields cutting out the young trees with *machetes*, (a kind of cutlass,) at a cost of about 25 cents per acre. Mr. Codrington says:

On coming to Florida I perceived at once that the great want of the State was a good grass to suit the climate. I wrote to Jamaica for some seeds of the hardiest variety, called there the "St. Mary's grass." This I planted in the spring of 1872, and got about twelve plants to grow. As fast as the roots got sufficiently large I took them up, separated them and replanted, some roots giving me twenty-five to thirty plants; but I found that the planting should be done immediately after a heavy rain, when the earth is quite wet. I continued this operation until September, when I allowed the plants to go to seed. Part of the seed I gathered, and left some to drop. The plants stood several severe frosts before the grass was killed. I then cut it off and found stock even then eat it with avidity. This spring the old roots sprouted again, and all around them innumerable young plants came up from the seed that had been sown the last autumn. I continued the same system this summer that I did with my plants in 1872, with perfect success. Others, who procured plants from me and have followed the directions, have also succeeded, and it now only requires enterprise to make this State the grazing State of the Union; for the success of the grass I consider established beyond a doubt. The land I used was the poorest, worn-out pine land; too poor even to grow sweet-potatoes. I had the grass 8 feet high in some places, and I cut some of it three times during the summer.

He adds, in a postscript:

In planting from roots, the tops should be cut off before planting; and do *not* plant the roots *straight*, but in a slanting position, almost lying down. Do not plant deep; about four inches of the stem should be out of the ground.

A letter on the same subject has been received from Mr. Adams, of Jacksonville, Fla., to whom a small quantity of seed, received from Jamaica, had been sent by the Department for experiment. He sowed the seed in rather poor, light land, slightly manured. It grew rapidly and steadily, even luxuriantly, "and has at the height of two feet (December 11) been cut three or four times during the season, and is now flourishing finely." Mr. A. continues:

It does not "plant" or spread from the root during the first season as much as I had expected, showing that probably the best way to start a field is by broadcast or drill sowing. But as to its adaptability to the climate and soil of the South, and of Florida especially, (where the greatest agricultural need is confessedly a grass that will bear sun and drought,) I have not a shadow of doubt. In two-thirds of the northern and southern extent of the State cattle are raised without any feed or care except grazing at large; yet there is an annual ratio of increase of more than 30 per cent. So that with an available grass to supplement the natural or wild grasses, Florida is bound to be an important cattle and stock raising State.

EXPERIMENT WITH GRASS.—A package of grass-seed, *Lolium Italicum*, having been sent to a gentleman in Cobb County, Georgia, he conceived the idea of an experiment to determine whether cutting early, and not allowing seed to ripen, would preserve the vitality of the roots. In a former season he had raised grass on a piece of ground on which sheep were pastured, and gathered twenty-seven bushels of clean seed from three-fourths of an acre; the stems were three feet high; still, after cutting, all the old roots and the fallen seed sprouted, but the dry weather and crab-grass together killed both.

At the time of sowing the *Lolium Italicum*, above mentioned, the season was unfavorable on account of the early springing up of the crab-grass, which smothers whatever has not got a good start in advance of it. The planting was on the 3d of March, on good, high ground, well prepared and manured with Charleston phosphates. A second application of phosphate was made on the 2d of June. It was first cut June 23, to keep down the weeds and crab-grass, when a few seed-stems were in bloom; a second cutting was made about seven weeks after—weather hot and dry. At the date of writing, November 24, there was every hope of the success of the experiment, with the help of nitrogenous fertilizing.

This correspondent thinks that the best cultivated grass for that part of the State, which is of granitic formation, is the orchard, since it stands hot and cold, dry and wet weather, equally well.

CORN IN MAINE.—Adams' Early corn grew 10 feet high last season, but had many false stalks, ears short; "too late," says our correspondent, "by three weeks, for Maine." He finds that corn grown two hundred miles north or south accommodates itself to the seasons of Maine in about ten years.

DEPARTMENT SEEDS IN LOUISIANA.—Dr. Allen, of Saint Mary's Parish, says of the garden-seeds received from the Department, that some of the varieties have developed and flourished beyond any of the kinds he has ever before seen in that section. He mentions the early red onion, Brussels sprouts, horticultural pole-bean, kohl rabi, purple cap brocoli, large Brunswick cabbage, and McLean's advancer peas, as having produced well; but that each was the best of its kind, as to quality, that he had ever tasted. The McLean pea proved a wonder; with a low vine, requiring no support in the way of sticks, it produced an extraordinary number of pods, each pod filled with the largest and most tender peas "I ever tasted." In conclusion, Dr. Allen says that he cannot conceive of a more satisfactory or more profitable garden than one planted with the same kind and assortment of seeds as those distributed by the Department.

ARNAUTKA WHEAT.—A correspondent of Vivian, Minnesota, says that Arnautka wheat proves to be hardy, vigorous, and very productive, but grades as "rejected" in Chicago, and sells at 15 cents per bushel less than varieties usually grown in his locality. The complaint against the wheat is as to its flintiness. He says the varieties of spring-wheat grown in Eastern Europe all rust so as to shrink badly when grown in Minnesota.

PEELER COTTON.—Two quarts of this cotton-seed were planted in Greene County, North Carolina, in sandy loam; seed dropped at intervals of 12 inches, in rows 3½ feet apart, occupying about one-eighth of an acre. Amount of seed-cotton picked, 150 pounds, which made 50 pounds of lint, equal to 400 pounds per acre; considered a very good yield in that county. Our informant says that the staple is considerably longer and finer than any other variety in the county. This variety is only the ordinary cotton of our Southern States developed by selection and superior cultivation.

SORGHUM.—Mr. James Vaux, of Iowa, says of the imported sorghum (black seed) sent to him by the Department, that he planted the seed side by side with the same quantity of the large red variety, and that the former was far the richer in product, growing also three feet higher than the latter. From twenty rows grown across a two-acre garden he made forty-three gallons of molasses, which was thick and of good quality. Planted the last of April.

FULTZ WHEAT.—In Saratoga County, New York, one grain of Fultz wheat is reported as having thrown out nine stalks bearing 378 kernels. Selected heads in the field contained 50, 53, 58, and up to 63 kernels.

FLOWER-SEEDS.—A Missouri correspondent says that the vegetable and flower seeds he received from the Department have invariably proven true to name and of superior kind. Of the flowers he freely distributed seeds of their production, and a hundred homes have been adorned.

IMMIGRATION IN 1872-'73.—The records of the Bureau of Statistics, Treasury Department, show that 459,803 immigrants arrived in the United States during the year ending June 30, 1873. Of these, 66,859 had attained the age of forty years or more, 288,272 were between the

ages of fifteen years and forty years, and 104,672 were under fifteen years of age. The following table gives the principal nationalities of the immigrants:

Countries.	Males.	Females.	Total.
England	45,094	29,777	74,801
Ireland	40,993	36,351	77,344
Scotland	8,254	5,587	13,841
Germany	86,411	63,260	149,671
Austria	3,098	2,667	5,765
Sweden	8,656	5,647	14,303
Norway	9,928	6,319	16,247
Denmark	3,326	1,605	4,931
Netherlands	2,282	1,529	3,811
Switzerland	1,943	1,164	3,107
France	9,500	5,298	14,798
Italy	6,851	1,864	8,715
Poland	2,224	1,114	3,338
China	19,403	889	20,292
Canada	17,113	14,598	31,711
Nova Scotia	2,093	1,826	3,919
Other British North American provinces	1,240	1,001	2,241
All other countries	7,453	3,515	10,968
Total	275,792	184,011	459,803

The total immigration from the British Isles was 166,843. There were 1,560 immigrants from Russia, 1,347 from Hungary, 1,176 from Belgium, 1,161 from the Azores, 962 from Cuba, and 1,130 from Australia. The following gives a general classification of occupations:

Occupations.	Males.	Females.	Total.
Professional occupations	2,747	239	2,986
Skilled occupations	47,490	1,302	48,792
Miscellaneous occupations	152,575	16,143	168,718
Occupations not stated, (chiefly women and children)	1,371	3,497	4,868
Without occupation	71,609	162,830	234,439
Total	275,792	184,011	459,803

Detailed statements of occupations show 36,983 farmers, 530 farm-laborers, 538 gardeners, 104,423 laborers, 7,038 merchants and dealers, 6,406 carpenters, 4,293 masons, 2,411 shoemakers, 2,393 tailors, 1,894 blacksmiths, 334 clergymen, 187 physicians, and 370 teachers.

PROFIT IN CLOVER-SEED.—Our correspondent in Outagamie County, Wisconsin, reports that from the second crop on a clover-field of ten acres, clover-seed was harvested which sold for $340.

UNIFORMITY IN WEIGHTS AND MEASURES.—One of our correspondents calls attention to the desirableness, on account of its great practical value, of a law passed by Congress securing uniformity in weights and measures throughout the country. In illustration of the evils of the present system, in which each State and Territory has its own independent standard, he states that the legal weight for a bushel of seed is in some States 12 pounds less than in others. Those who are not aware of these differences in weight or measure are often deceived by quotations in the newspapers, and in buying or selling in markets outside of their own State.

FOREST-TREES.—The following is an extract from the recent message of the governor of Pennsylvania addressed to the legislature of that State:

I respectfully invite your attention to an evil of considerable magnitude, which every year grows more aggravated, and in certain regions, at times, is the occasion of serious apprehension. I refer to the wholesale destruction of our forests, the stripping of our mountains and hills of their trees, resulting in an enormous diminution of water for mechanical and fertilizing purposes, and in great changes in the normal conditions of temperature and moisture, affecting the general health and at seasons bringing about devastating floods. These consequences, as the effects of this indiscriminate waste, are demonstrable, and a wise legislation will forecast the future and establish such regulations as will rescue our descendants from the ills a perseverance in this practice will certainly entail upon them.

PENNSYLVANIA FISH COMMISSION.—In his recent message, the governor of Pennsylvania communicates facts and conclusions of general interest respecting the transactions and anticipated results of the fish commission of that State. Assuming that the success of fish-culture is now assured; that its extent is to be limited only by the wants of consumers and the capacity of the streams, rivers, and lakes of the country, and that Pennsylvania has superior advantages for producing fish, not only of ordinary but of rare and most delicious varieties, he gives the following summary of the doings of the State commissioners the past year: At Newport, Perry County, where the water is especially adapted to the purpose, they succeeded in hatching, by the aid of Mr. Seth Green's patent, 2,700,000 shad, which were turned into the Juniata at that point. They also, during July and August, distributed in the Susquehanna, Lehigh, and Juniata, 2,600 black bass. Through the cooperation of Professor Baird, United States Fish Commissioner, 27,000 California salmon were planted in the Susquehanna and its tributaries. In 1870 two or three hundred bass, which are represented as not migratory, and very prolific, were placed in the Susquehanna near Harrisburgh, and the great number now found in the river in that vicinity affords evidence of the rapidity with which they multiply. The law creating the commission directed that four fish-ways should be constructed at different dams on the Susquehanna and Juniata, but the commissioners regarding the question whether fish will ascend an artificial way as still a mooted one, have thus far constructed only one; that is at the Columbia dam, and is 120 feet long, 60 wide, very gradual in the ascent, and made as nearly as possible to imitate a natural fish-way. If in the spring it is found that shad pass up this, the construction of the others will immediately follow. The commissioners have erected and properly furnished, near Marietta, a hatching-house, supplied with water from an inexhaustible spring, and having a capacity equal to the proper care of 700,000 young fish.

RATE OF EXHAUSTION OF MANURES.—At a late meeting of the Ayrshire Farmers' Club, Scotland, the subject discussed was, compensation to outgoing tenants for permanent improvements and unexhausted manures. By way of illustration an agreement with his tenantry entered into by Sir Patrick Keith Murry was introduced. Among the principal points were these: the beneficial effects of horse, cow, and town manure, guano, bones, and coprolites are held to last four years, and the rate of exhaustion to be $\frac{4}{10}$ the first year, and $\frac{1}{10}$ less each succeeding year; of lime, applied to arable land, to last ten years, and the rate of exhaustion $\frac{10}{55}$ the first year, and $\frac{1}{55}$ less each succeeding year; applied to permanent pastures to last twelve years, and the rate of exhaustion $\frac{15}{78}$ the first year, $\frac{14}{78}$ the second, and $\frac{1}{78}$ less each succeeding. Nitrate of soda and sulphate of ammonia are held to be exhausted by the crop to which they are applied. For oil-cake or any similar substance of equal manurial value except grain of all kinds, purchased and used by the tenant in feeding sheep or cattle on the farm, $\frac{1}{6}$ of the entire cost of all so used during the

last three years of occupation shall be allowed. The value of any new manures not included in the above list, and the unexhausted value of any included, but of a quality better or worse than average, or applied in exceptional quantity or under exceptional circumstances, is to be determined by arbitration. In the course of the proceedings it was unanimously resolved:

That in the opinion of this meeting the land of this country will never be farmed in such a way as to make it produce all that it is capable of doing until a law is passed giving fair and reasonable compensation to the tenant, when he leaves his farm, for all unexhausted improvements and manures that will add to the value of the farm; and that, on the other hand, when a tenant, through negligence and bad farming, deteriorates the natural fertility of the soil, he should be compelled to pay his landlord for all such deterioration.

WILD CATS IN MAINE.—Our correspondent in Hancock County states that within the last two years wild cats have been making great havoc of sheep in that section. It is estimated that during the past season they destroyed in one town sheep valued at $100.

WOLVES IN PENNSYLVANIA.—Our correspondent in Elk County reports that wolves have lately been very destructive among sheep in that locality. One man lost his whole flock, 55; and during the past six months as many as 150 had been killed by them within a distance of five miles. Our correspondent in Clearfield also states that great numbers of sheep have been killed by wolves in that county within the preceding two months.

EXTRAORDINARY YIELDS OF CORN.—Mr. John W. Murry, of Carroll County, Maryland, reports in the Westminster Advocate, that on one acre, the past season, he raised 30½ barrels (152½ bushels) of shelled corn. The reported culture was as follows: the land was so situated that it received the washings from the road and from his barn-yard, and had been in grass for fifteen years. In the spring of 1872 he plowed it and planted it in corn. The yield that year was 26½ barrels. On the 16th of May, 1873, he plowed the corn-stubble ground very deep, and harrowed and rolled it. The next day he sowed 300 pounds of bone-dust and harrowed it again, marked it off 32 inches one way, sowed 200 pounds of Rhodes's super-phosphate in the rows, and dropped the corn, one and two kernels in the hills, 10 inches apart. The variety of corn was the Chester County Mammoth Yellow. On the 4th of June, as much was missing, he "dragged the ground and replanted;" plowed on the 10th, some hills still missing; on the 17th plowed, hoed, and "plastered the weak spots;" on the 30th dragged, plowed and thinned; on the 4th of July "hilled with a potato-plow as deep as one horse could pull," and continued to thin as it required until the shoots appeared.

According to a report of the Agricultural Society of Washington, Pa., Mr. James W. Dickey, whose farm lies partly in that county and partly in Brooke County, West Virginia, produced last season, on 15 acres, 2,535¾ bushels of shelled corn—average 169 bushels per acre. The only conditions of culture reported were these: the field had been used for a sheep-pasture for the preceding eighteen years. In the spring, as soon as the frost was out, he broke up the sod, plowing not deeper than three inches, planted with good seed, and gave due care and culture to the growing crop.

BLEDSOE COUNTY, TENNESSEE,—The following is condensed from a report to this Department by the secretary of the Farmers and Mechanics' Association in this county. The crops of wheat and rye the past season were the best for several years. Wheat sells at $1.25; rye, 75 cents; corn, 50 cents; oats, 50 cents; potatoes, Irish and sweet, 40 to 50 cents;

cattle, $2.50 per cwt., gross; hogs, (badly thinned by cholera,) $3.75 to $4; horses and mules, "dull sale at low prices." Our correspondent further reports:

Lands are greatly reduced in price. Farms which were purchased five and six years ago for $20 and $25 per acre can now be had at $12 to $18 per acre. Mountain table-lands are a mere drug—worth from 10 cents to $1 per acre, and no buyers. Five years ago these lands were sold readily at $2 to $5 and $10 per acre, according to amount of improvement. Wild lands generally (and wild-cat titles) on Walden's Ridge and Cumberland Mountain get away with northern and western men. The object of many unprincipled men here is to rob and plunder. They write flattering letters to be published in the different agricultural papers of the Union, or send out circulars in every direction; and for the past four or five years they have succeeded admirably in entrapping the unwary. Now, however, the pens of those who have been *taken in* are making vast changes in regard to emigration; hence the great decline in the prices of mountain lands. We might safely add that two-thirds of the immigration to these lands for the past five years have migrated elsewhere after having been stripped of every dollar and valuable. The mountain is the home of the rich man who can number his cattle by the hundred and in the autumn drive them to his farm in the valley, or to market. The land is not adapted to agricultural purposes, or, at least, has failed for some reason to produce enough to bread the settlements, and, therefore, men with limited means cannot accomplish anything on them.

MARION COUNTY, OREGON.—Under date of December 1, the Secretary of Rock Point Farmers' Club, in this county, reports that within its limits the year 1873 has been one of general prosperity to agricultural industry. Farmers have realized good crops and higher prices than ever before. The wheat crop was 20 per cent. larger than any previous one, averaging 30 bushels per acre; rye, 30 bushels per acre; corn, potatoes, and hay were average; oats, 10 per cent. below; wool and cheese, each 10 per cent. above; butter, 10 per cent. below, but in good demand at 37½ cents per pound; the number of horses 20 per cent. and of hogs 30 per cent. below. Cattle plenty and dull sale, except for good dairy-stock; all kinds of fruit plenty except peaches. Prices: Wheat, $1 per bushel; rye, 75 cents; oats, 40; potatoes, 40; dried apples, 6 cents per pound; dried plums, 16; beef on the hoof, 5 cents net; pork, 5½, net; hay, $10 per ton.

RICE STRAW.—Our correspondent in McIntosh County, Georgia, reports that rice-straw in that section has become an important article of traffic. It is used largely by farmers and lumberers as a substitute for hay, and is also in great demand for the manufacture of paper.

ATASCOSA COUNTY, TEXAS.—This county is situated in the interior of Southern Texas. A correspondent communicates the following statement respecting its products in 1873: Besides the "enormous number" of cattle killed and stolen away by Indians and Mexicans, over 50,000 were driven to distant markets, and yet "untold thousands" remain in the county. The cotton-crop turned out 450 to 500 pounds of lint-cotton to the acre; corn, 35 bushels; sorghum, sweet-potatoes, and other vegetables, also pea-nuts and the native Mustang grape, a full crop.

THE COW-PEA IN SOIL RESTORATION.—On almost every plantation in the cotton States there are worn-out cotton-fields, which must remain unproductive until restored by fertilization. To find a fertilizer adapted to the wants of the soil, involving neither cost nor trouble of transportation, easy of application, and yielding the quickest and largest returns with the smallest outgo, is a great desideratum. The cow-pea, as an agent in soil restoration, combines in a large degree these advantages. A planter in Gwinnett County, Georgia, reports as follows: Having a worn-out field of 20 acres which had been lying in broom-sedge for several years, he broke it up in the summer of 1868, plowing deep with a turn-over plow. In the fall he sowed it in wheat. The yield, carefully measured,

was a little less than 4 bushels per acre. In 1869, immediately after harvesting the wheat, he sowed cow-peas at the rate of 2 bushels per acre. Early in October he turned the resulting crop under with a deep furrow. A few weeks later he sowed on this pea-sod wheat, harrowing it in carefully. He harvested 9 bushels per acre. He repeated the same process in 1870, and realized 17½ bushels per acre; and again in 1871, followed by a yield of 27 bushels per acre; and again in 1872, with a promise at the time of reporting of 40 bushels per acre. Throughout this experiment, covering five years, no fertilizer except the cow-pea was applied.

PRODUCTION OF IRON AND STEEL IN THE UNITED STATES.—The following facts are condensed from a report of the secretary of the American Iron and Steel Association, made at its late annual meeting. The number of furnaces in the country, not counting abandoned and projected, is 636. Of these, 41 were completed and put in blast in 1872, and 42 in 1873. These 83 increased the furnace capacity of the country fully one-fourth. The ascertained and estimated numbers of net tons of iron and steel produced in the United States in 1872 and 1873 respectively were:

	1872.	1873.
Iron and steel rails	941,992	850,000
Other rolled and hammered iron	1,000,000	930,000
Forges and bloomeries	58,000	50,000
Cast steel	32,000	28,000
Bessemer steel	110,500	140,000
Pig-iron	2,830,070	2,695,434

Pig-iron is now made in twenty-two States, and the estimated annual capacity of all the furnaces for producing it is 4,371,277 net tons. Sixteen States manufacture iron and steel rails, and of the aggregate Pennsylvania produces 44½ per cent.; Ohio ranks second, and Illinois third; these two States having exchanged ranks since 1872. New York holds the fourth place. On the 17th of September, the day before the financial crisis, the quoted prices of raw and manufactured iron were as follows: American Bessemer rails, $120; iron rails, $75; No. 1 pig-iron at Philadelphia, $12; merchant bars at Pittsburgh, 3½ cents; English iron rails at New York, $65, gold; the prices asked November 1 were, for Bessemer rails at mill, $110; iron rails at mill, $68; best No. 1 anthracite pig-iron at Philadelphia, $36; merchant bars at Pittsburgh, 3 cents; English iron rails at New York, $60, gold. It is estimated that fully one-third of the 636 furnaces above named were blown out by the 1st of November, and that one-half would be by the end of the month.

EFFECTS OF COLD IN FATTENING.—A producer of pork in Muskingum County, Ohio, who has made an experiment with hogs, with a view to ascertain how far cold retards the rate of fattening, reports the following results: Carefully weighing the hogs fed, and the corn fed to them, and estimating pork at four cents per pound, he found that what he fed out during the first week in October returned (in pork) 80 cents per bushel; the first week in November, 60 cents; the third week 40; the fourth week in November and the month of December, 25; the first half of January, 5; the last half, 0. In the October week of the experiment the weather was pleasant and warm. It gradually grew colder till the latter part of November, from which time it remained about stationary till the 1st of January, after which it ran down to zero, and below in the latter part of the month. The hogs were well sheltered in a good pen with plank floor.

TRIAL OF THE PARVIN STEAM-PLOW.—This plow, patented by R. C. Parvin, works by "direct traction." It is manufactured at Farmington, Fulton County, Illinois, and costs $4,000. A trial of it, reported as entirely successful, took place under the direction of the inventor, at Dixon, Solano County, California, November 11. The ground, stiff clay, or clay adobe, was a field of wheat stubble, from which the grain had been harvested by heading. An eight-gang plow was first attached and found not adapted to the conditions. A large three-gang plow and a two-gang plow were substituted, each cutting a foot wide furrow and running 5 to 6 inches deep. With forty pounds of steam it traveled off and worked these plows with ease. Subsequently twelve men got upon the plows and a drag was attached so that both plows and drag ran to the depth of 10 to 12 inches. By applying 80 pounds of steam the engine again had sufficient draft power to move forward and plow without apparent effort. It appeared to be as easily managed in its movements as a team of farm-horses. Its speed is regulated by the amount of steam, and is controlled by the operator up to the rate of three miles per hour. The proper rate is represented to be about two miles per hour. Moving at this rate, never tiring, and plowing a ribbon 5 to 8 feet wide, it is easy to estimate the amount it would plow per day. To run it requires a man and boy, and a "tender to furnish fuel and water." The inventor claims that one of these steam-plows has, at a cost of 75 cents per acre, "broken up the toughest kind of prairie meadow" in Illinois. In this estimate the cost of hands was reckoned at $2.50 per day, and of coal at $2.50 per ton. It is reported that so much confidence in its success has been inspired that a joint-stock company is being organized in Sacramento for the purpose of manufacturing these steam-plows.

THE SEASON OF RAIN-FALL IN CALIFORNIA.—The amount of rain-fall at Sacramento for the last four months of 1873 was 11.529 inches; the amount for the same months in 1871 was 12.021 inches. This was followed by 11.326 inches in the first four months of 1872; in 1867, 16.662, followed by 15.837 in 1868; in 1866, 11.938, followed by 13.359 in 1867; whereas, the 7.540 inches which fell in the last four months of 1872 was followed by only 6.653, in the first four of 1873; in 1869, 4.932, followed by 8.639 in 1870; in 1868, 3.386, followed by 12.602 in 1869. These facts seem to furnish ground for anticipating an abundant rain-fall (and consequently a fruitful season) in the four months following January 1, 1874.

PORK PACKING IN THE WEST.—The Cincinnati *Price Current* gives the following statement of the number of hogs packed up to January 22 of the present and previous season at the six principal packing points of the West, together with the total operations of last season:

	To January 22, 1874.	To January 22, 1873.	Total for the season of 1872 and 1873.
Cincinnati	550, 000	560, 000	626, 305
Chicago	1, 275, 000	980, 000	1, 425, 079
Saint Louis	430, 000	460, 000	538, 000
Louisville	230, 000	300. 000	302, 246
Milwaukee	240, 000	175, 000	303, 500
Indianapolis	235, 000	150, 000	196, 317
Total	2, 960, 000	2, 625, 000	3, 391, 447

The aggregate number, at the date above mentioned, is 430,000 short of the operations of the previous season. On account of the scarcity of hogs at some points, and of high prices and poor qualities at other points the packings had nearly or quite closed.

MARKET PRICES OF FARM-PRODUCTS.

The following quotations represent the state of the market, as nearly as practicable, on the 1st day of January, 1874:

Articles.	Price.		
NEW YORK.			
Flour, superfine State...per bbl.	$5 60	to	$6 00
extra State.....do...	6 55	to	7 30
superfine western...do...	5 60	to	6 00
extra to choice western, per barrel.....	6 50	to	11 00
common to fair, extra southern.....per bbl.	6 85	to	8 00
good to choice, extra southern.....per bbl.	8 05	to	11 00
Wheat, No. 1 spring...per bush.	1 63	to	1 65
No. 2 spring.....do...	1 58	to	1 61½
winter, red, western, per bushel.....	1 58	to	1 65
winter, amber, western, per bushel.....	1 65	to	1 68
winter, white, western, per bushel.....	1 70	to	1 95
Rye.....per bush.	1 00	to	— —
Barley.....do...	1 55	to	— —
Corn.....do...	78	to	85
Oats.....do.	60	to	63
Hay, first quality.....per ton	26 00	to	28 00
second quality.....do...	23 00	to	25 00
Beef, mess.....per bbl.	8 75	to	11 00
extra mess.....do...	11 50	to	13 00
Pork, mess.....do...	16 37½	to	16 50
extra prime.....do...	13 00	to	— —
prime mess.....do...	14 25	to	14 75
Lard.....per lb.	8 13-16	to	9⅛
Butter, western.....per lb.	26	to	35
State dairy.....do...	33	to	45
Cheese, State factory.....do...	12	to	14¾
western factory....do...	12	to	14¾
Cotton, ordinary to good ordinary.....per lb.	13½	to	14⅝
low middling to good middling.....per lb.	15⅝	to	17⅝
Sugar, fair to good, refining...do...	7⅛	to	7¾
prime, refining.....do...	7⅞	to	—
Tobacco, lugs.....do...	6¼	to	7⅜
common to medium leaf.....per lb.	8	to	10
Wool, American XXX and picklock.....per lb.	62	to	70
American X and XX, per pound.....	47	to	60
American, combing..per lb.	52	to	60
pulled.....do...	25	to	52
California spring clip, per pound.....	18	to	35
California fall clip and lambs'.....per lb.	19	to	29
Texas.....per lb.	15	to	35
BOSTON.			
Flour, western, superfine..per bbl.	5 50	to	6 00
western extras.....do...	6 75	to	8 00
western choice.....do...	8 50	to	11 00
southern extras.....do...	6 50	to	7 00
choice Baltimore....do...	9 00	to	11 00
Wheat.....per bush.	1 50	to	1 85
Rye.....per bush.	1 00	to	1 05
Barley.....do...	1 25	to	1 75
Corn, southern yellow.....do...	83	to	85
western yellow.....do...	89	to	90
Oats.....do...	60	to	63
Hay, eastern and northern, per ton.....	15 00	to	25 00
Hay, western choice.....per ton	24 00	to	25 00
Beef, western mess.....per bbl.	10 00	to	12 00
western extra.....do...	13 00	to	14 00
Pork, prime.....do...	13 00	to	14 00
mess.....do...	16 50	to	17 00

Articles.	Price.		
BOSTON—Continued.			
Lard.....per lb.	$0 09½	to	$0 10
Butter, N. Y. and Vt.....per lb.	30	to	40
western, fair to extra, per pound.....	28	to	35
Cheese, N. Y. and Vermont factory, per pound.....	12	to	15
western factory, per pound.....	11	to	14½
Sugar, fair to good refining, per pound.....	7⅜	to	8
Tobacco, lugs.....per lb.	7½	to	9
common to medium leaf.....per lb.	9	to	10½
Cotton, ordinary to good ordinary.....per lb.	14	to	15½
low middling to good middling.....per lb.	16	to	18
Wool, Ohio and Pa.....do...	48	to	65
Michigan.....do...	45	to	53
other western.....do...	40	to	52
pulled.....do...	25	to	60
combing fleece.....do...	55	to	60
California.....do...	17	to	36
Texas.....do...	18	to	30
PHILADELPHIA.			
Flour, superfine.....per bbl.	4 50	to	5 50
Pa. extra.....do...	6 75	to	— —
Pa. family and fancy.do...	7 00	to	8 00
western, extra.....do...	6 00	to	6 75
western family.....do...	6 75	to	8 00
Wheat, winter, red....per bush.	1 47	to	1 63
winter, amber.....do...	1 68	to	1 70
winter, white.....do...	1 73	to	1 85
spring.....do...	1 55	to	1 59
Rye.....do...	90	to	93
Barley.....do...	1 20	to	1 65
Corn.....do...	70	to	85
Oats.....do...	52	to	58
Hay, fresh baled.....per ton.	23 00	to	24 00
common to fair shipping, per ton.....	20 00	to	22 00
Beef, western mess.....per bbl.	8 00	to	10 00
extra mess.....do...	9 00	to	12 00
Warthman's city family, per barrel.....	16 00	to	— —
Pork, mess.....per bbl.	16 50	to	17 00
prime mess.....do...	15 00	to	— —
prime.....do...	13 00	to	— —
Lard.....per lb.	8¾	to	11½
Butter, choice Middle States, per pound.....	30	to	42
choice western...per lb.	30	to	38
Cheese, N. Y. factory.....do...	14	to	15
Ohio factory.....do...	14	to	14½
Sugar, fair to good refining..do...	7⅝	to	7¾
Cotton, ordinary to good ordinary.....per lb.	14	to	15½
low middling to good middling.....per lb.	15½	to	18½
Wool, Ohio fleece X and XX..do...	55	to	—
Ohio combing.....do...	60	to	63
pulled.....do...	42½	to	50
unwashed, clothing and combing.....per lb.	31	to	43
BALTIMORE.			
Flour, superfine.....per bbl	5 25	to	6 00
extra.....do...	6 75	to	8 50
family and fancy....do...	— —	to	10 75
Wheat, white, fair to choice, per bushel.....	1 70	to	1 90

Market-prices of farm-products—Continued.

Articles.	Price.		
BALTIMORE—Continued.			
Wheat, amber.....per bush.	$1 65	to	$1 87
red.....do...	1 60	to	1 80
Rye, common to prime .....do...	90	to	98
Corn, white southern .....do...	70	to	78
yellow southern.....do...	74	to	80
Oats, southern .....do...	51	to	54
western .....do...	50	to	53
Hay, Pennsylvania.....per ton.	20 00	to	24 00
Maryland.....do...	24 00	to	25 00
Beef, Baltimore mess....per bbl.	15 00	to	20 00
extra ..... do...	23 00	to	25 00
Pork, mess..... do...	15 50	to	16 25
Lard .....per lb.	9	to	9½
Butter, western .....do...	24	to	35
eastern .....do...	24	to	35
Cheese, eastern cutting ....do...	15½	to	16
western cutting ...do...	14½	to	15
Sugar, fair to good refining..do...	7¾	to	8
Tobacco, lugs .....do...	5	to	8
common to medium leaf, per pound.....	7	to	10
Cotton, ordinary to good ordinary .....per lb.	14	to	14½
low middling to middling.....per lb.	15½	to	16¾
Wool, fleece com. to fine..per lb.	45	to	50
tub-washed.....do...	55	to	60
unwashed .....do...	35	to	38
pulled .....do...	35	to	40
CINCINNATI.			
Flour, superfine.....per bbl.	5 00	to	5 50
extra .....do...	6 00	to	6 60
family and fancy ....do...	6 85	to	7 25
Wheat, red winter ...per bushel.	1 30	to	1 52
hill.....do...	1 55	to	1 60
white.....do...	1 60	to	1 65
Rye ....do...	93	to	95
Barley .....do...	1 20	to	1 60
Corn .....do...	56	to	60
Oats .....do...	44	to	50
Hay, baled, No. 1.....per ton.	15 00	to	16 00
lower grades .....do...	10 00	to	14 00
Pork, mess .....per bbl.	15 25	to	15 50
Lard .....per lb.	8¾	to	8¾
Butter, choice .....do...	28	to	30
prime .....do...	25	to	27
Cheese, prime factory .....do...	13½	to	14
Sugar, N. O., fair to good....do...	8¾	to	9¼
prime to choice.....do...	9¾	to	10
Tobacco, lugs .....do...	9	to	12
leaf.....do...	15	to	25
Cotton, ordinary to good ordinary .....per lb.	12½	to	13¾
low middling to good middling .....per lb.	14½	to	16½
Wool, fleece common to fine, per pound	45	to	46
tub-washed .....per lb	48	to	49
unwashed, clothing .do...	30	to	32
unwashed, combing .do...	33	to	35
pulled .....do...	35	to	37
CHICAGO.			
Flour, white winter, fair to good, per barrel.....	6 75	to	7 50
white winter, choice, per barrel.....	8 00	to	9 25
red winter .....per bbl.	5 75	to	7 00
medium to fancy spring extras, per barrel.....	4 75	to	6 25
spring superfine..per bbl.	2 50	to	4 25
Wheat, No. 1 spring ...per bush.	1 20	to	— —
No. 2 spring.....do...	1 17¼	to	1 18
No. 3 spring.....do...	1 14	to	1 14½
Corn, No. 2 .....do...	49	to	53½
Oats, No 2 ....do...	38½	to	— —

Articles.	Price.		
CHICAGO—Continued.			
Rye, No. 2 .....per bush.	$0 73	to	$0 80
Barley, No. 2 .....do...	1 43	to	1 45
Hay, timothy.....per ton.	11 00	to	15 50
prairie .....do...	7 00	to	10 50
Beef, mess .....per bbl.	8 25	to	8 50
extra mess.....do...	9 75	to	10 00
Pork, mess .....do...	14 35	to	14 40
prime mess.....do...	13 00	to	13 25
extra prime.....do...	11 00	to	11 25
Lard .....per cental.	8 45½	to	8 50
Butter, choice to fancy ...per lb.	30	to	34
medium to good ...do...	22	to	27
Cheese, N. Y. factory .....do...	15	to	16
Ohio and western factory .....per lb.	14	to	15
Sugar, N.O., prime to choice .do...	8¾	to	9¼
N.O., common to fair.do...	7½	to	8½
Wool, tub-washed, common to prime .....per lb	40	to	50
fleece-washed.....do...	36	to	45
unwashed .....do...	25	to	32
pulled .....do...	30	to	35
SAINT LOUIS.			
Flour, spring.....per bbl.	5 00	to	6 40
winter .....do...	5 00	to	9 00
Wheat, red winter.....per bush.	1 24	to	1 65
white winter .....do...	1 32½	to	1 66½
spring.....do...	1 21	to	1 28
Corn.....do...	50	to	54
Rye.....do...	80	to	83
Barley .....do...	1 20	to	1 65
Hay, choice timothy.....per ton	16 00	to	— —
mixed.....do...	12 00	to	14 00
Beef, mess.....per bbl.	13 00	to	— —
Pork, mess.....do...	14 50	to	15 00
Lard .....per lb.	7¾	to	9¼
Butter, common to medium, packed.....per lb.	20	to	25
choice .....do...	28	to	32
Cheese, factory .....do...	13½	to	14
Sugar, N. O., common to fair, per pound	9	to	—
N. O., prime to choice, per pound	9½	to	10
Cotton, ordinary to good ordinary .....per lb.	12½	to	13¾
low middling to good middling.....per lb.	14½	to	15½
Wool, tub-washed ....do...	50	to	52
fleece-washed. .....do...	35	to	42
unwashed combing ..do...	29	to	31
NEW ORLEANS.			
Flour, superfine .....per bbl.	5 25	to	5 50
extras.....do...	6 00	to	7 00
choice to fancy .....do...	8 00	to	9 75
Corn, white, ...per bush.	71	to	72
yellow .....do...	70	to	74
Oats.....do...	57	to	58
Hay, choice.....per ton.	25 00	to	— —
prime .....do...	21 00	to	— —
Beef, Texas.....per bbl	11 00	to	12 00
Fulton market ...per ½ bbl.	11 00	to	12 00
western .....do...	9 00	to	9 50
Pork, mess.....per bbl	15 25	to	— —
Lard .....per lb.	8½	to	9¾
Butter, choice southern.....do...	42	to	— —
choice western.....do...	30	to	33
Cheese, choice western factory, per pound.....	14½	to	15
N. Y. cream .....per lb	17	to	— —
Sugar, fair to fully fair .....do...	6¾	to	7¾
prime to strictly prime, per pound	8	to	8¼
clarified, white, and yellow, per pound....	8½	to	10

Market-prices of farm-products—Continued.

Articles.	Price.	Articles.	Price.
NEW ORLEANS—Continued.		SAN FRANCISCO—Continued.	
Cotton, ordinary to good ordinary, per pound	$0 11¼ to $0 13½	Oats, per cental	$1 60 to $1 85
low middling to good middling, per lb	14⅝ to 17½	Corn, white, do	1 40 to 1 45
Tobacco, lugs, do	5½ to 7½	yellow, do	1 40 to 1 45
low leaf to medium leaf, per pound	7¾ to 9¾	Hay, State, per ton	13 00 to 18 00
Wool, lake, per lb	25 to — —	Beef, mess, per bbl	9 50 to 10 00
SAN FRANCISCO.		family mess, per ½ bbl	9 00 to 10 00
Flour, superfine, per bbl	5 50 to 5 75	Pork, mess, per bbl	18 00 to 18 50
extra, do	6 00 to — —	prime mess, do	16 00 to 16 50
family and fancy, do	6 25 to 7 00	Lard, per lb	10 to 11
Wheat, California, per cental	2 25 to 2 30	Butter, overland, do	15 to 25
Oregon, do	2 25 to 2 30	California, do	30 to 45
Barley, do	1 35 to 1 65	Oregon, do	15 to 20
		Cheese, do	12 to 18
		Wool, native, do	13 to 18
		California, do	18 to 22
		Oregon, do	18 to 22

LIVE-STOCK MARKETS.

Articles.	Price.	Articles.	Price.
NEW YORK.		CHICAGO—Continued.	
Cattle, extra beeves, per cental	$12 50 to $13 00	Cattle, Texans, choice corn-fed, per cental	$4 25 to $4 75
good to prime, do	11 75 to 12 25	Texans, north-summered, per cental	3 00 to 3 75
common to fair, do	10 25 to 11 50	Texans, through-droves, per cental	1 75 to 2 75
average, do	10 25 to 11 25	Sheep, poor to choice, per cental	3 00 to 5 00
Texans, do	7 50 to 10 00	Swine, poor to common, do	4 90 to 5 10
premium bullocks, do	13 00 to 13 50	medium, do	5 20 to 5 30
milch-cows, ordinary to choice, per head	40 00 to 80 00	good to extra, do	5 35 to 5 55
calves, grass-fed, per head	6 00 to 12 00	SAINT LOUIS.	
Sheep, per cental	3 50 to 7 37½	Cattle, choice native steers, 1,300 to 1,600 pounds, per cental	5 00 to 5 50
Swine, do	5 37½ to 5 87½	prime second-class, 1,150 to 1,400 pounds, per cental	4 50 to 4 75
PHILADELPHIA.		good third grade, 1,050 to 1,300 pounds, per cental	3 50 to 3 75
Cattle, common to choice beeves, per cental	3 50 to 8 00	fair butchers' steers, 1,000 to 1,200 pounds, per cental	3 25 to 3 50
Sheep, per cental	4 50 to 6 25	inferior native grades, per cental	2 00 to 4 25
Swine, corn-fed, do	7 50 to 7 75	Texans and Cherokees, corn-fattened, per cental	1 75 to 4 00
BALTIMORE.		through-droves, do	1 50 to 3 00
Cattle, best beeves, per cental	5 75 to 7 00	Sheep, do	3 75 to 5 00
first quality, do	4 75 to 5 75	Swine, do	2 81 to 5 37½
medium or good fair quality, per cental	4 00 to 4 75	Horses, plugs, per head	30 00 to 65 00
general average of the market, per cental	5 12 to — —	street-car horses, do	75 00 to 90 00
extreme range of prices, per cental	3 00 to 7 00	good work-horses, do	80 00 to 100 00
Sheep, per cental	4 00 to 6 50	driving-animals, good to extra, per head	90 00 to 150 00
Swine, do	7 00 to 8 25	draught horses, heavy to extra heavy, per head	125 00 to 175 00
CINCINNATI.		Mules, 14 to 15 hands high, per head	60 00 to 110 00
Cattle, common to fine butchers' beeves, per cental	2 75 to 5 25	15 to 16 hands high, per head	120 00 to 160 00
shipping grades, do	4 50 to 5 25	extra, per head	150 00 to 200 00
milch-cows, per head	35 00 to 60 00	NEW ORLEANS.	
calves, per cental	6 00 to 7 00	Cattle, Texas beeves, choice, per head	— — to 45 00
Sheep, common to prime grades, per cental	3 50 to 5 00	first quality, per head	35 00 to 40 00
Swine, per cental	5 25 to 5 80	second quality, do	20 00 to 28 00
CHICAGO.		western beeves, per cental	10 00 to 12 50
Cattle, extra-graded steers, 1,400 to 1,550 pounds, per cental	5 80 to 6 00	milch-cows, per head	35 00 to 100 00
choice, fat, well-formed, 3 to 5 years old, 1,300 to 1,450 pounds, per cental	5 30 to 5 65	calves, do	7 00 to 10 00
good, well-formed and fattened, 1,200 to 1,350 pounds, per cental	4 90 to 5 15	Sheep, first quality, do	4 00 to 5 00
medium, fair-fleshed, 1,150 to 1,250 pounds, per cental	4 50 to 4 75	second quality, do	3 00 to 4 00
lower grade natives, per cental	1 75 to 4 40	Swine, per cental	7 50 to 8 00

FOREIGN MARKETS.

WHEAT.—The year 1873, in England, closed with fair prospects to the grain-growing interest. A very unusual mildness of weather prevailed through Christmas week, with very little wet or frost. A good breadth of wheat had been sown, and the early sown fields, for the most part, looked even and well. Those more lately planted were springing up favorably. The price of wheat was well maintained, and there was every prospect that it would so continue clear up to harvest. Wheat-sowing in France was generally forward, and there was no apparent drawback to the crop except a lack of rain, which is desirable on light lands to settle the plantings before frost comes. In continental Europe the prospects of the crop just sown were generally favorable, even in Hungary, where drought and vermin had been so injurious to the crop of 1873. The acknowledged deficiency of the rye-crop, however, had kept up the high rates of some continental markets. Late rains had greatly improved the newly sown crop of Australia.

The sales of English wheat during Christmas week amounted to 56,610 quarters, at 61*s.* 7*d.*, against 53,276 quarters, at 56*s.* 3*d.*, during the Christmas week of 1873. The London averages were 63*s.* 1*d.* on 2,387 quarters. The imports of the week ending December 20 were 1,011,288 hundred-weight of wheat and 172,500 hundred-weight of flour. Monday before Christmas opened upon small supplies of English wheat, but a large stock of foreign, more than half of the latter being from New York.

In Mark Lane, new Essex and Kent white wheat brought from 53*s.* to 68*s.* per quarter. Norfolk, Lincolnshire, and Yorkshire new red, 55*s.* to 61*s.*; Dantzic and Konigsberg, 62*s.* to 72*s.*; Rostock, 62*s.* to 71*s.*; Silesia, red, 57*s.* to 66*s.*; Pomerania, Mecklenberg, and Uckermark, 62*s.* to 64*s.*; Ghiska, 55*s.* to 61*s.*; Russian hard, 52*s.* to 57*s.*; Saxonska, 61*s.* to 63*s.*; Danish and Holstein red, 62*s.* to 64*s.*; American, 57*s.* to 62*s.*; Chilian white, 65*s.*; Californian, 67*s.*; Australian, 68*s.*

In Liverpool American white brought 12*s.* 10*d.* to 13*s.* per cental; ditto, red winter and southern, 13*s.* to 13*s.* 4*d.*; ditto, spring, No. 1, 12*s.* 4*d.* to 12*s.* 8*d.*; Canadian white, 13*s.* 6*d.* to 13*s.* 9*d.*; ditto, red, 12*s.* 8*d.* to 12*s.* 10*d.*; California white, 13*s.* 6*d.* to 14*s.* 6*d.*; Australian, 14*s.* to 14*s.* 2*d.*; Chilian, 12*s.* 8*d.* to 13*s.* 2*d.*; Spanish white, 13*s.* 6*d.* to 14*s.*; Danubian, 7*s.* to 9*s.*; Ghiska, 11*s.* 6*d.* to 12*s.* 2*d.*; Egyptian, 10*s.* 9*d.* to 12*s.* 8*d.*

FLOUR.—The supplies of English flour in Mark Lane were good, with a large import of American in barrels. The Paris flour trade during the week was very inactive. Prices were generally steady in the continental markets, and but little varied from our last report.

MAIZE.—In Mark Lane American white was quoted at 36*s.* to 38*s.* per quarter; ditto, yellow, 35*s.* to 37*s.* In Liverpool, American white, 36*s.* 9*d.* to 37*s.* 6*d.*; ditto, yellow, to 37*s.* 6*d.*; Galatz, 38*s.* 6*d.*; Danubian, 37*s.* 9*d.*

WOOL.—English wool was in moderate demand in London. For colonial produce there had been but little demand since the close of the public sales. Prices about the same as in our last monthly report.

LIVE STOCK.—In London, coarse inferior cattle brought 4*s.* 4*d.* to 4*s.* 10*d.* per 8 pounds, sinking the offal; second quality, 5*s.* 4*d.* to 5*s.* 8*d.*; prime large oxen, 6*s.* 2*d.* to 6*s.* 4*d.*; prime Scots, 6*s.* 4*d.* to 6*s.* 6*d.*; sheep, 4*s.* 8*d.* to 6*s.* 10*d.*; prime Southdowns, 6*s.* 10*d.* to 7*s.*; calves, 5*s.* 10*d.* to 6*s.* 2*d.*; hogs, 3*s.* 10*d.* to 5*s.*